

**BEFORE SUBMITTING YOUR BID**

- 1. Use pen and ink to complete the Bid.**
- 2. Have you signed and completed the Contract Agreement, Offer & Award Forms?**
- 3. As a minimum, the Bidder will submit a Bid Package consisting of the Notice to Contractors, the completed Acknowledgement of Bid Amendments & Submission of Bid Bond Validation Number form, the completed Schedule of Items, 2 copies of the completed Agreement, Offer, & Award form, a Bid Bond or Bid Guarantee, and any other Certifications or Bid Requirements listed in the Bid Book.**
- 4. Have you included prices for all Bid Items? (“Zero is not considered a bid price.”)**
- 5. Have you included a bid guarantee? Acceptable forms are:**
  - A. Bid Bond on the Department’s prescribed form for 5% of the Bid Amount. (Or forms that do not contain any significant variations from the Department’s forms as solely determined by the Department.)**
  - B. Official Bank Check, Cashier’s Check, Certified Check, U.S. Postal Money Order or Negotiable Certificate of Deposit in the amount stated in the Notice to Contractors.**
- 6. If the written Bid is to be sent, Federal Express overnight delivery is suggested as the package is delivered directly to the DOT Headquarters Building in Augusta. Other means, such as U.S. Postal Services’ Express Mail has proven not to be reliable.**

**AND FOR FEDERAL AID PROJECTS**

- 7. Have you included your DBE Utilization commitment in the proper amounts and signed the DBE Certification?**

**If you need further information regarding Bid preparation, call the DOT Contracts Section at (207)624-3430.**

**For complete specifications regarding bidding requirements, refer to Section 102 of the Maine Department of Transportation, Standard Specifications, Revision December 2002.**

# NOTICE

**The Maine Department of Transportation is attempting to improve the way Bid Amendments/Addendums are handled, and allow for an electronic downloading of bid packages from our website, while continuing to maintain a planholders list.**

**Prospective bidders, subcontractors or suppliers who wish to download a copy of the bid package and receive a courtesy notification of project specific bid amendments, must provide an email address to Diane Barnes at the MDOT Contracts mailbox at: [MDOT.contracts@maine.gov](mailto:MDOT.contracts@maine.gov). Each bid package will require a separate request. Please provide us an email address, so we can maintain the planholders list that both the industry and MDOT uses.**

**Additionally, the new Acknowledgement of Bid Amendment form will be placed in MDOT bid packages beginning with the 2/12/03 advertisements. After that date, interested parties will be responsible for reviewing and retrieving the Bid Amendments from our web site, and acknowledging receipt and incorporating those Bid Amendments in their bids.**

The downloading of bid packages from the MDOT website is not the same as providing an electronic bid to the Department. Electronic bids must be submitted via <http://www.BIDX.com>. For information on electronic bidding contract Rebecca Pooler at [rebecca.pooler@maine.gov](mailto:rebecca.pooler@maine.gov).

**STATE OF MAINE DEPARTMENT OF TRANSPORTATION**  
Bid Guaranty-Bid Bond Form

**KNOW ALL MEN BY THESE PRESENTS THAT**\_\_\_\_\_

\_\_\_\_\_, of the City/Town of \_\_\_\_\_ and State of \_\_\_\_\_

as Principal, and \_\_\_\_\_ as Surety, a

Corporation duly organized under the laws of the State of \_\_\_\_\_ and having a usual place of

Business in \_\_\_\_\_ and hereby held and firmly bound unto the Treasurer of

the State of Maine in the sum of \_\_\_\_\_ for payment which Principal and Surety bind

themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

The condition of this obligation is that the Principal has submitted to the Maine Department of

Transportation, hereafter Department, a certain bid, attached hereto and incorporated as a

part herein, to enter into a written contract for the construction of \_\_\_\_\_

\_\_\_\_\_ and if the Department shall accept said bid

and the Principal shall execute and deliver a contract in the form attached hereto (properly

completed in accordance with said bid) and shall furnish bonds for this faithful performance of

said contract, and for the payment of all persons performing labor or furnishing material in

connection therewith, and shall in all other respects perform the agreement created by the

acceptance of said bid, then this obligation shall be null and void; otherwise it shall remain in full

force, and effect.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

WITNESS:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WITNESS

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PRINCIPAL:

By \_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

SURETY:

By \_\_\_\_\_

By: \_\_\_\_\_

Name of Local Agency: \_\_\_\_\_

# NOTICE

For security and other reasons, all Bid Packages which are mailed, shall be provided in double (one envelope inside the other) envelopes. The *Inner Envelope* shall have the following information provided on it:

Bid Enclosed - Do Not Open

PIN:

Town:

Date of Bid Opening:

Name of Contractor with mailing address and telephone number:

In Addition to the usual address information, the *Outer Envelope* should have written or typed on it:

Double Envelope: Bid Enclosed

PIN:

Town:

Date of Bid Opening:

Name of Contractor:

*This should not be much of a change for those of you who use Federal Express or similar services.*

Hand-carried Bids may be in one envelope as before, and should be marked with the following information:

Bid Enclosed: Do Not Open

PIN:

Town:

Name of Contractor:

# INSTRUCTIONS FOR PREPARING THE CONTRACTOR'S DISADVANTAGED BUSINESS ENTERPRISE UTILIZATION PLAN

## The Contractor Shall:

1. Submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan to the Contract's Engineer by 4:30 P.M. on the Bid day.
2. Extend equal opportunity to MDOT certified DBE firms (as listed in MDOT's DBE Directory of Certified Businesses) in the selection and utilization of Subcontractors and Suppliers.

## SPECIFIC INSTRUCTIONS FOR COMPLETING THE FORM:

Insert Contractor name, the name of the person(s) preparing the form, and that person(s) telephone and fax number.

Provide total Bid price, Federal Project Identification Number, and location of the Project work.

In the columns, name each DBE firm to be used, provide the Unit or Item cost of the Work/Product to be provided by the DBE firm, give a brief description of the Work, and the dollar value of the Work.

If no DBE firm is to be utilized, the Contractor must document the reason(s) why no DBE firms are being used. Specific supporting evidence of good faith efforts taken by Contractors to solicit DBE Bidders must be attached. This evidence, as a minimum, includes phone logs, e-mail and/or mail DBE solicitation records, and the documented results of these solicitations.

# NOTICE

The Department has revised the Disadvantaged Business Enterprise Proposed Utilization form and the procedure that has been used for the past several months for Contractors to submit the form.

The Apparent Low Bidder now must submit the form by close of Business (4:30 P.M.) on Bid day.

The new Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form contains additional information that is required by USDOT.

The Disadvantaged Business Enterprise Proposed Utilization Plan form will no longer be used. The new Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form must be used.

A copy of the new Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan and instructions for completing it are attached.

Note: Questions about DBE firms, or to obtain a printed copy of the DBE Directory, contact Equal Opportunity at (207) 624-3066.

MDOTs DBE Directory of Certified firms can also be obtained at [http://www.state.me.us/mdot/humnres/o\\_equalo/cdwbed\\_h.htm](http://www.state.me.us/mdot/humnres/o_equalo/cdwbed_h.htm)

# NOTICE

Bidders:

Please use the attached “Request for Information” form when faxing questions and comments concerning specific Contracts that have been Advertised for Bid. Include additional numbered pages as required.

# REQUEST FOR INFORMATION

Response By:\_\_\_\_\_ Date: \_\_\_\_\_



# CONTRACTOR'S DISADVANTAGED BUSINESS ENTERPRISE PROPOSED UTILIZATION PLAN

Low Bidder shall furnish completed form to Contracts Section by 4:30 P.M. on Bid Opening day.

TO: MDOT Contracts Section  
16 State House Station,  
Augusta, Me 04333-0016  
or  
Fax: 207-624-3431

Contractor: \_\_\_\_\_

Prepared by: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

BID PRICE: \$ \_\_\_\_\_ FEDERAL PROJECT # \_\_\_\_\_ LOCATION: \_\_\_\_\_

TOTAL DBE PARTICIPATION AS A PERCENT OF TOTAL BID PRICE = \_\_\_\_\_ %

DBE Firm*	Unit/Item Cost	Unit #	Description of work & Item Number	Actual \$ Value
Total >				

If no DBE firm(s) are used, bidder must document efforts made to secure DBE participation and attach supporting evidence of this effort:

\_\_\_\_\_  
\_\_\_\_\_.

Examples: Bidder relies wholly upon low quote subcontractor section, DBE firm(s) were not low quote.  
No DBE firms bid.

\*Only DBE firms certified by MDOT prior to bidding can be utilized by Contractor for DBE credit.  
Directory of certified DBEs is available on MDOT's website: [www.state.me.us/mdot](http://www.state.me.us/mdot)

Equal Opportunity Use:

Plan received \_\_\_\_/\_\_\_\_/\_\_\_\_ Verified by: \_\_\_\_\_ Action: \_\_\_\_\_



## Office of Human Resources

### Equal Opportunity

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## MAINE DEPARTMENT OF TRANSPORTATION

Certified Disadvantaged and Women Business Enterprise

DBE DIRECTORY - MINORITY OWNED

WBE DIRECTORY - WOMEN OWNED

WEBSITE FOR DIRECTORY CAN BE FOUND AT:

[http://www.state.me.us/mdot/humnres/o\\_equalo/cdwbed\\_h.htm](http://www.state.me.us/mdot/humnres/o_equalo/cdwbed_h.htm)

*It is the responsibility of the Contractor to access the DBE Directory at this site in order to have the most current listings.*

## STATE OF MAINE DEPARTMENT OF TRANSPORTATION NOTICE TO CONTRACTORS

Sealed Bids addressed to the Maine Department of Transportation, Augusta, Maine 04333 and endorsed on the wrapper "Bids for Repairs to Rockland Engine House in the city of Rockland" will be received from contractors at the Reception Desk, Maine DOT Building, Child Street, Augusta, Maine, until 11:00 o'clock A.M. (prevailing time) on February 25, 2004, and at that time and place publicly opened and read. There will be a Statement of Bidder's Qualification submittal required by the Department, as specified in the contract documents Special Provision Section 103.3 for all bidders for this project. All other Bids may be rejected. MDOT provides the option of electronic bidding. We now accept electronic bids for those bid packages posted on the bidx.com website. Electronic bids do not have to be accompanied by paper bids. Please note: the Department will accept a facsimile of the bid bond; however, the original bid bond must then be received at the MDOT Contract Section within 72 hours of the bid opening. During this transition, dual bids (one paper, one electronic) will be accepted, with the paper copy taking precedence.

Description: Maine Project No. 10304.00, PIN. 10304.00

Location: In Knox County, project is located at the Rockland Engine House.

Outline of Work: Electrical rehabilitation, lighting and emergency lighting, including pit lights, overhead fans and other incidental work.

For general information regarding Bidding and Contracting procedures, contact Scott Bickford at (207)624-3430. Our webpage at <http://www.state.me.us/mdot/project/design/homepg.htm> contains a copy of the schedule of items, Plan Holders List, written portions of bid amendments (not drawings), and bid results. For Project-specific information fax all questions to **Project Manager** George Jackman at (207)624-3431. Questions received after 12:00 noon of Monday prior to bid date will not be answered. Bidders shall not contact any other Departmental staff for clarification of Contract provisions, and the Department will not be responsible for any interpretations so obtained. Hearing impaired persons may call the Telecommunication Device for the Deaf at (207)287-3392.

Plans, specifications and bid forms may be seen at the Maine DOT Building in Augusta, Maine and at the Department of Transportation's Division V Office in Rockland. They may be purchased from the Department between the hours of 8:00 a.m. to 4:30 p.m. by cash, credit card (Visa/Mastercard) or check payable to Treasurer, State of Maine sent to Maine Department of Transportation, Attn.: Mailroom, 16 State House Station, Augusta, Maine 04333-0016. They also may be purchased by telephone at (207)624-3536 between the hours of 8:00 a.m. to 4:30 p.m. Full size plans \$10.00 (\$14.00 by mail). Half size plans \$5.00 (\$8.00 by mail), Bid Book \$10 (\$13 by mail), Single Sheets \$2, payment in advance, all non-refundable.

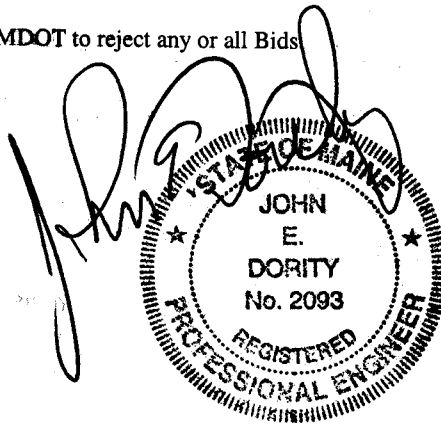
Each Bid must be made upon blank forms provided by the Department and must be accompanied by a bid bond at 5% of the bid amount or an official bank check, cashier's check, certified check, certificate of deposit, or United States postal money order in the amount of \$5,000.00 payable to Treasurer, State of Maine as a Bid guarantee. A Contract Performance Surety Bond and a Contract Payment Surety Bond, each in the amount of 100 percent of the Contract price, will be required of the successful Bidder.

This Contract is subject to all applicable Federal Laws. This contract is subject to compliance with the Disadvantaged Business Enterprise program requirements as set forth by the Maine Department of Transportation.

All work shall be governed by "State of Maine, Department of Transportation, Standard Specifications, Revision of December 2002", price \$10 [\$13 by mail], and Standard Details, Revision of December 2002, price \$20 [\$25 by mail] Standard Detail updates can be found at <http://www.state.me.us/mdot/project/design/homepg.htm>

The right is hereby reserved to the MDOT to reject any or all Bids

Augusta, Maine  
February 4, 2004



JOHN E. DORITY  
CHIEF ENGINEER

**SPECIAL PROVISION 102.7.3  
ACKNOWLEDGMENT OF BID AMENDMENTS  
&  
SUBMISSION OF BID BOND VALIDATION NUMBER (IF APPLICABLE)**

With this form, the Bidder acknowledges its responsibility to check for all Amendments to the Bid Package. For each Project under Advertisement, Amendments are located at <http://www.state.me.us/mdot/comprehensive-list-projects/project-information.php>. It is the responsibility of the Bidder to determine if there are Amendments to the Project, to download them, and to incorporate them into their Bid Package. The Maine DOT will not post Bid Amendments any later than noon the day before Bid opening.

Amendment Number	Date

The Contractor, for itself, its successors and assigns, hereby acknowledges that it has received all of the above referenced Amendments to the Bid Package. Failure to acknowledge receipt of all Amendments to the Bid Package will be considered a Non-curable Bid Defect in accordance with Section 102.11.1 of the Standard Specifications, Revision of December 2002.

CONTRACTOR

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of authorized representative

\_\_\_\_\_  
(Name and Title Printed)

**Bid Bond Validation Number** \_\_\_\_\_  
**(Applicable to annual bid bonds or electronic bid bonds.)**

MAINE DEPARTMENT OF TRANSPORTATION

BID

DATE OF OPENING :

CALL ORDER :

CONTRACT ID : 010304.00

PROJECTS

-----

010304.00

COUNTY : KNOX

## SCHEDULE OF ITEMS

REVISED:

CONTRACT ID: 010304.00

PROJECT(S): 010304.00

CONTRACTOR : \_\_\_\_\_

LINE	ITEM	APPROX.	UNIT PRICE	BID AMOUNT
NO	DESCRIPTION	QUANTITY		
		AND UNITS	DOLLARS   CTS	DOLLARS   CTS

## SECTION 0001 LIGHTING

	890.01 SPECIAL WORK #1				
0010	LIGHTING AND EMERGENCY	LUMP	LUMP		
	LIGHTING				
	SECTION 0001 TOTAL				
	TOTAL BID				

## **CONTRACT AGREEMENT, OFFER & AWARD**

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

**(Name of the firm bidding the job)**

a corporation or other legal entity organized under the laws of the State of Maine, with its principal place of business located at **(address of the firm bidding the job)**

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

### **A. The Work.**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, PIN No. **1224.00**

for the **Hot Mix Asphalt Overlay** in the town/city of **West Eastport**, County of **Washington**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

### **B. Time.**

The Contractor agrees to complete all Work, except warranty work, on or before **November 15**, 2003. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, Revision of December 2002.

**C. Price.**

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is (Place bid here in alphabetical form such as One Hundred and Two dollars and 10 cents) \$ (repeat bid here in numerical terms, such as \$102.10) Performance Bond and Payment Bond each being 100% of the amount of this Contract.

**D. Contract.**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, Revision of December 2002, Standard Details Revision of December 2002, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

**E. Certifications.**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to Division 100 of the Standard Specifications Revision of December 2002 (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

**F. Offer.**



The undersigned, having carefully examined the site of work, the Plans, Standard Specifications, Revision of December 2002, Standard Details Revision of December 2002, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

**PIN 1234.00 West Eastport, Hot Mix Asphalt Overlay**

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, Revision of December 2002, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work on the date specified in the Engineer's "Notice to Commence Work" as stated in Section 107.2 of the Standard Specifications Revision of 2002 and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan by 4:30pm on the day of bid opening to the Contracts Engineer.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR  
(Sign Here)  
\_\_\_\_\_  
(Signature of Legally Authorized Representative  
of the Contractor)  
(Witness Sign Here) \_\_\_\_\_ (Print Name Here)  
Witness \_\_\_\_\_  
(Name and Title Printed)

**G. Award.**

Your offer is hereby accepted.  
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

\_\_\_\_\_  
Date  
  
\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
By: David A. Cole, Commissioner

## **CONTRACT AGREEMENT, OFFER & AWARD**

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and \_\_\_\_\_

\_\_\_\_\_ a corporation or other legal entity organized under the laws of the State of Maine, with its principal place of business located at \_\_\_\_\_

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

### **A. The Work**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, **PIN. 10304.00**, for the Construction of **Repairs to Rockland Engine House** in the city of **Rockland** County of **Knox**, in The State of, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

### **B. Time**

The Contractor agrees to complete all Work, except warranty work, on or before **August 20, 2004**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of Standard Specifications, Revision of December 2002.

### **C. Price**

The LUMP SUM Bid Price will be used as the basis for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is \_\_\_\_\_

\$\_\_\_\_\_ Performance Bond  
and Payment Bond each being 100% of the amount of this Contract.

### **D. Contract**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, Revision of December 2002, Standard Details, Revision of 2002 as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

### **E. Certifications**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to the Division 100 General Conditions (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

## F. Offer

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications, Revision of December 2002, Standard Details, Revision of December 2002 as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of: **PIN. 10304.00 – Repairs to Rockland Engine House** in the city of **Rockland** State of Maine, on which bids will be received until the time specified in the “Notice to Contractors” do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract”.

The Offeror agrees to perform the work required at the price specified above and in” strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, which may be ordered by the Resident, and to accept as full compensation the amount determined upon a “Force Account” basis as provided in the Standard Specifications, Revision of December 2002, and as addressed in the contract documents, including Section 109.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier’s check, certificate of deposit or U. S. Postal Money Order in the amount given in the “Notice to Contractors”, payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work on the date specified in the Engineer’s “Notice to Commence Work” as stated in Section 107.2 of the Standard Specifications, Revision of December 2002, and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor’s Disadvantaged Business Enterprise Utilization Plan by 4:30pm on the day of bid opening to the Contracts Engineer.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Signature of Legally Authorized Representative  
of the Contractor)

\_\_\_\_\_  
Witness

\_\_\_\_\_  
(Name and Title Printed)

**G. Award**

**Your offer is hereby accepted. This award consummates the Contract, and the documents referenced herein.**

MAINE DEPARTMENT OF TRANSPORTATION

\_\_\_\_\_  
Date

\_\_\_\_\_  
By: David A. Cole, Commissioner

\_\_\_\_\_  
Witness

## **CONTRACT AGREEMENT, OFFER & AWARD**

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and \_\_\_\_\_

\_\_\_\_\_ a corporation or other legal entity organized under the laws of the State of Maine, with its principal place of business located at \_\_\_\_\_

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

### **A. The Work**

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The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

### **B. Time**

The Contractor agrees to complete all Work, except warranty work, on or before **August 20, 2004**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of Standard Specifications, Revision of December 2002.

### **C. Price**

The LUMP SUM Bid Price will be used as the basis for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is \_\_\_\_\_

\$\_\_\_\_\_ Performance Bond  
and Payment Bond each being 100% of the amount of this Contract.

### **D. Contract**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, Revision of December 2002, Standard Details, Revision of 2002 as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

### **E. Certifications**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to the Division 100 General Conditions (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.



## F. Offer

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications, Revision of December 2002, Standard Details, Revision of December 2002 as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of: **PIN. 10304.00 – Repairs to Rockland Engine House** in the city of **Rockland** State of Maine, on which bids will be received until the time specified in the “Notice to Contractors” do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract”.

The Offeror agrees to perform the work required at the price specified above and in” strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, which may be ordered by the Resident, and to accept as full compensation the amount determined upon a “Force Account” basis as provided in the Standard Specifications, Revision of December 2002, and as addressed in the contract documents, including Section 109.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier’s check, certificate of deposit or U. S. Postal Money Order in the amount given in the “Notice to Contractors”, payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work on the date specified in the Engineer’s “Notice to Commence Work” as stated in Section 107.2 of the Standard Specifications, Revision of December 2002, and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor’s Disadvantaged Business Enterprise Utilization Plan by 4:30pm on the day of bid opening to the Contracts Engineer.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Signature of Legally Authorized Representative  
of the Contractor)

\_\_\_\_\_  
Witness

\_\_\_\_\_  
(Name and Title Printed)

**G. Award**

**Your offer is hereby accepted. This award consummates the Contract, and the documents referenced herein.**

MAINE DEPARTMENT OF TRANSPORTATION

\_\_\_\_\_  
Date

\_\_\_\_\_  
By: David A. Cole, Commissioner

\_\_\_\_\_  
Witness

BOND # \_\_\_\_\_

CONTRACT PERFORMANCE BOND  
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That \_\_\_\_\_  
\_\_\_\_\_ **and the State of** \_\_\_\_\_, as principal,  
and \_\_\_\_\_,  
a corporation duly organized under the laws of the State of \_\_\_\_\_ and having a  
usual place of business \_\_\_\_\_,  
as Surety, are held and firmly bound unto the Treasurer of the State of Maine in the sum  
of \_\_\_\_\_ **and 00/100 Dollars (\$** \_\_\_\_\_ **)**,  
to be paid said Treasurer of the State of Maine or his successors in office, for which  
payment well and truly to be made, Principal and Surety bind themselves, their heirs,  
executors and administrators, successors and assigns, jointly and severally by these  
presents.

The condition of this obligation is such that if the Principal designated as Contractor in  
the Contract to construct Project Number \_\_\_\_\_ in the Municipality of \_\_\_\_\_  
promptly and faithfully performs the Contract, then this  
obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the State  
of Maine.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

WITNESSES:

Signature.....  
Print Name Legibly .....

Signature .....

Print Name Legibly .....

SURETY ADDRESS:  
.....  
.....

TELEPHONE.....

SIGNATURES:

CONTRACTOR:

Print Name Legibly .....  
SURETY:

Print Name Legibly .....

NAME OF LOCAL AGENCY:

ADDRESS .....  
.....

.....

BOND # \_\_\_\_\_

CONTRACT PAYMENT BOND  
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That \_\_\_\_\_  
\_\_\_\_\_ **and the State of** \_\_\_\_\_, as principal,  
and \_\_\_\_\_  
a corporation duly organized under the laws of the State of \_\_\_\_\_ and having a  
usual place of business in \_\_\_\_\_,  
as Surety, are held and firmly bound unto the Treasurer of the State of Maine for the use  
and benefit of claimants as herein below defined, in the sum of  
\_\_\_\_\_ **and 00/100 Dollars (\$** \_\_\_\_\_ **)**  
for the payment whereof Principal and Surety bind themselves, their heirs, executors and  
administrators, successors and assigns, jointly and severally by these presents.

The condition of this obligation is such that if the Principal designated as Contractor in  
the Contract to construct Project Number \_\_\_\_\_ in the Municipality of  
\_\_\_\_\_ promptly satisfies all claims and demands incurred for all  
labor and material, used or required by him in connection with the work contemplated by  
said Contract, and fully reimburses the obligee for all outlay and expense which the  
obligee may incur in making good any default of said Principal, then this obligation shall  
be null and void; otherwise it shall remain in full force and effect.

A claimant is defined as one having a direct contract with the Principal or with a  
Subcontractor of the Principal for labor, material or both, used or reasonably required for  
use in the performance of the contract.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20 .. .

WITNESS:

SIGNATURES:

CONTRACTOR:

Signature.....

Print Name Legibly .....

SURETY:

Signature.....

Print Name Legibly .....

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

ADDRESS .....

.....

TELEPHONE .....

Wage Determination - In accordance with 26 MRSA §1301 et. seq., this is a determination by the Bureau of Labor Standards, of the fair minimum wage rate to be paid laborers and workers employed on the below titled project.

**Title of Project** ----- Repairs to Rockland Engine House and Turntable

**Location of Project** -- Rockland, Maine in Knox County

**2004 Fair Minimum Wage Rates  
Building 2 Knox County  
(other than 1 or 2 family homes)**

<u>Occupation Title</u>	<u>Median Wage</u>	<u>Median Benefit</u>	<u>Total</u>	<u>Occupation Title</u>	<u>Median Wage</u>	<u>Median Benefit</u>	<u>Total</u>
Asbestos Abatement Wrkr	\$14.00	\$1.26	\$15.26	Ironworker - Reinforcing	\$14.00	\$1.35	\$15.35
Assembler - Metal Bldg	\$12.00	\$0.00	\$12.00	Ironworker - Structural	\$14.89	\$2.42	\$17.31
Bricklayer	\$20.00	\$1.03	\$21.03	Laborers/Helper/Tender	\$11.00	\$0.80	\$11.80
Bulldozer Operator	\$11.13	\$1.43	\$12.56	Laborer - Skilled	\$13.00	\$1.70	\$14.70
Carpenter	\$15.45	\$2.88	\$18.33	Machine Assembler	\$18.00	\$5.74	\$23.74
Carpenter - Acoustical	\$14.20	\$0.97	\$15.17	Mechanic - Maintenance	\$17.00	\$2.68	\$19.68
Carpenter - Rough	\$12.75	\$1.75	\$14.50	Mechanic - Refrigeration	\$19.00	\$2.98	\$21.98
Cement Mason/Finisher	\$14.00	\$1.56	\$15.56	Millwright	\$18.00	\$1.63	\$19.63
Commun Equip Installer	\$18.31	\$18.08	\$36.39	Oil/Fuel Burner Serv & Instr	\$14.42	\$2.02	\$16.44
Concrete Pump Operator	\$17.25	\$1.61	\$18.86	Painter	\$11.00	\$2.73	\$13.73
Crane Operator <15 Tons	\$16.25	\$2.83	\$19.08	Paperhanger	\$13.00	\$0.00	\$13.00
Dry-Wall Applicator	\$18.00	\$0.00	\$18.00	Pipe/Stm/Sprkler Fitter	\$19.00	\$3.60	\$22.60
Dry-Wall Taper & Finisher	\$18.00	\$0.58	\$18.58	Plumber (Licensed)	\$17.50	\$2.69	\$20.19
Electrician	\$19.00	\$6.08	\$25.08	Plumber Trainee	\$13.00	\$2.69	\$15.69
Electrician Hlpr (Licensed)	\$12.86	\$2.48	\$15.34	Roofer	\$12.75	\$1.48	\$14.23
Elevator Constrctr/Installer	\$27.45	\$10.06	\$37.51	Sheet Metal Worker	\$14.25	\$1.99	\$16.24
Excavator Operator	\$15.62	\$3.71	\$19.33	Sider	\$12.25	\$0.00	\$12.25
Floor Layer	\$12.00	\$1.39	\$13.39	Swimming Pool Installer	\$18.45	\$4.92	\$23.37
Glazier	\$12.00	\$2.50	\$14.50	Tile Setter	\$18.64	\$5.89	\$24.53
Industrial Truck (Frklft) Op	\$18.00	\$5.74	\$23.74	Truck Driver - Heavy	\$11.84	\$1.54	\$13.38
Insulation Installer	\$12.00	\$1.53	\$13.53				

The Laborer classifications include a wide range of work duties. Therefore, if any specific occupation to be employed on this project is not listed in this determination, call the Bureau of Labor Standards at the above number for further clarification.

Welders are classified in the trade to which the welding is incidental.

Apprentices - The minimum wage rate for registered apprentices are those set forth in the standards and policies of the Maine State Apprenticeship and Training Council for approved apprenticeship programs.

Posting of Schedule - Posting of this schedule is required in accordance with 26 MRSA §1301 et. seq., by any contractor holding a State contract for construction valued at \$50,000 or more and any subcontractors to such a contractor.

Appeal - Any person affected by the determination of these rates may appeal to the Commissioner of Labor by filing a written notice with the Commissioner stating the specific grounds of the objection within ten (10) days from the filing of these rates with the Secretary of State.

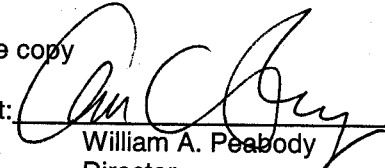
Determination No: B2-010-2004

Filing Date: January 23, 2004

Expiration Date: 12-31-2004

A true copy

Attest:

  
William A. Peabody  
Director  
Bureau of Labor Standards

PIN. 010304.00

Rockland

January 27, 2004

**SPECIAL PROVISION**

**SECTION 103.3**

**Post-bid Qualification**

**(Statement of Bidder's Qualification)**

As part of the submitted Bid, each Bidder shall demonstrate to the satisfaction of MEDOT the experience of the firm and/or subcontractor who will be implementing the work on this Contract. Written documentation of all such experience shall be provided with the Bid to MEDOT. Bidders shall furnish a list of all similar projects, including the name of the owner for whom the work was performed, the total construction cost of each project, and the name(s) of the Bidder's subcontractor's, project superintendent(s) and assistant superintendents(s) who had direct supervisory responsibility for the project listed. Said experience shall include, as a minimum, at least two (2) residential or commercial lighting projects within the last 5 years of equal or greater size and complexity as the work required by this Contract.

A statement of the bidder's qualifications, experience record in constructing the type of improvements embraced in this Contract, and personnel and equipment available for the work contemplated shall be included in the proposal.

When specifically requested by MEDOT, the Bidder shall submit a detailed financial statement. The MEDOT shall have the right to take such steps, as deems necessary to determine the ability of the bidder to perform its obligations under this Contract. The Bidder shall furnish MEDOT all such information and data for this purpose, as it may request. MEDOT reserves the right to reject any bid where an investigation of the available evidence of information does not satisfy MEDOT that the Bidder is qualified to properly carry out the terms of this Contract.

**Town: Rockland**  
**Project: 10304.00**  
**Date: January 23, 2004**

**SPECIAL PROVISIONS**  
**SECTION 104**  
**Utilities**

**MEETING**

A Preconstruction Utility Conference, as defined in Subsection 104.4.6 of the Standard Specifications **is not** required.

**GENERAL INFORMATION**

There are no aerial or subsurface utilities located within the limits of this project. Nothing in these Special Provisions is intended to replace, excuse, or relieve the Contractor from complying with the requirements/provisions of Title 23 M.R.S.A §3360-A, Maine “Dig Safe” System.

TWS/sc

Rockland  
10304.00  
January 27, 2004

SPECIAL PROVISION  
SECTION 107  
TIME

The specified contract completion date is August 20<sup>th</sup> 2004.



**SPECIAL PROVISION**  
(Consolidated Special Provisions)

**SPECIAL PROVISION SECTION 101**  
**CONTRACT INTERPRETATION**

**101.2 Definitions - Closeout Documentation**

Replace the sentence “A letter stating the amount..... DBE goals.” with “DBE Goal Attainment Verification Form”

**SPECIAL PROVISION SECTION 102**  
**DELIVERY OF BIDS**  
(Location and Time)

**102.7.1 Location and Time** Add the following sentence “As a minimum, the Bidder will submit a Bid Package consisting of the Notice to Contractors, the completed Acknowledgement of Bid Amendments & Submission of Bid Bond Validation Number form, the completed Schedule of Items, 2 copies of the completed Agreement, Offer, & Award form, a Bid Bond or Bid Guarantee, and any other Certifications or Bid Requirements listed in the Bid Book.”

**SPECIAL PROVISION SECTION 103**  
**AWARD AND CONTRACTING**

**103.3.1 Notice and Information Gathering**

Change the first paragraph to read as follows: “After Bid Opening and as a condition for Award of a Contract, the Department may require an Apparent Successful Bidder to demonstrate to the Department’s satisfaction that the Bidder is responsible and qualified to perform the Work.”

**SPECIAL PROVISION SECTION 105**  
**GENERAL SCOPE OF WORK**

**105.6.2 Contractor Provided Services**

Change the first paragraph by the addition of the following as the second sentence: “The Contractor is also responsible for providing construction centerline, or close reference points, for all Utility Facilities relocations and adjustments as necessary to complete the Work.”

## SPECIAL PROVISION SECTION 106 QUALITY

106.6 Acceptance Add the following to paragraph 1 of A: “This includes Sections 401 - Hot Mix Asphalt, 402 - Pavement Smoothness, and 502 - Structural Concrete - Method A - Air Content.”

Add the following to the beginning of paragraph 3 of A: “For pay factors based on Quality Level Analysis, and”

## SPECIAL PROVISION SECTION 107 TIME

107.3.1 General Add the following: “If a Holiday occurs on a Sunday, the following Monday shall be considered a Holiday. Sunday or Holiday work must be approved by the Department, except that the Contractor may work on Martin Luther King Day, President’s Day, Patriot’s Day, the Friday after Thanksgiving, and Columbus Day without the Department’s approval.”

## SPECIAL PROVISION SECTION 108 PAYMENT

108.4 Payment for Materials Obtained and Stored First paragraph, second sentence, delete the words “...Delivered on or near the Work site at acceptable storage places.”

## SPECIAL PROVISION SECTION 109 CHANGES

109.1.1 Changes Permitted Add the following to the end of the paragraph: “There will be no adjustment to Contract Time due to an increase or decrease in quantities, compared to those estimated, except as addressed through Contract Modification(s).”

109.1.2 Substantial Changes to Major Items Add the following to the end of the paragraph: “Contract Time adjustments may be made for substantial changes to Major Items when the change affects the Critical Path, as determined by the Department”

109.4.4 Investigation / Adjustment In the third sentence, delete the words “subsections (A) - (E)”

109.7.2 Basis of Payment Replace with the following: “Equitable Adjustments will be established by mutual Agreement for compensable items listed in Section 109.7.3-Compensable Items, based upon Unit or Lump Sum Prices. If Agreement cannot be reached, the Contractor shall accept payment on a Force Account basis as provided in Section 109.7.5 - Force Account Work, as full and complete compensation for all Work relating to the Equitable Adjustment.”

109.7.3 Compensable Items Replace with the following: “The Contractor is entitled to compensation for the following items, with respect to agreed upon Unit or Lump Sum Prices:

1. Labor expenses for non-salaried Workers and salaried foremen.
2. Costs for Materials.
3. A markup on the totals of Items 1 and 2 of this subsection 109.7.3 for home office overhead and profit of the Contractor, its Subcontractors and suppliers, and any lower tier Subcontractors or suppliers, with no mark-ups on mark-ups.
4. Cost for Equipment, based on Blue Book Rates or leased rates, as set forth in Section 109.7.5(C), or the Contractor’s Actual Costs.
5. Costs for extended job-site overhead.
6. Time.
7. Subcontractor quoted Work, as set forth below in Section 109.7.5 (F).”

109.7.5 Force Account Work

C. Equipment

Paragraph 2, delete sentence 1 which starts; “Equipment leased...”

Paragraph 6, change sentence 2 from “The Contractor may furnish...” to read “If requested by the Department, the Contractor will produce cost data to assist the Department in the establishment of such rental rate, including all records that are relevant to the Actual Costs including rental Receipts, acquisition costs, financing documents, lease Agreements, and maintenance and operational cost records.”

Add the following paragraph; “Equipment leased by the Contractor for Force Account Work and actually used on the Project will be paid for at the actual invoice amount plus 10% markup for administrative costs.”

Add the following section;

‘F. Subcontractor Quoted Work When accomplishing Force Account Work that utilizes Subcontractor quoted Work, the Contractor will be allowed a maximum markup of 5% for profit and overhead.”

### SPECIAL PROVISION SECTION 401 HOT MIX ASPHALT PAVEMENT

401.18 Quality Control Method A & B Make the following change to paragraph a. QCP Administrator; in the final sentence, change “...certified as a Plant Technician or Paving Inspector...” to “...certified as a Quality Assurance Technologist...”

401.201 Method A Under a. Lot Size, add the following; ‘Each lot will be divided into a minimum of four sublots for mix properties and five sublots for percent TMD.’”

### SPECIAL PROVISION SECTION 402 PAVEMENT SMOOTHNESS

Add the following: “Projects to have their pavement smoothness analyzed in accordance with this Specification will be so noted in Special Provision 403 - Bituminous Box.”

“402.02 Lot Size Lot size for smoothness will be 1000 lane-meters [3000 lane-feet]. A subplot will consist of 20 lane-meters [50 lane-feet]. Partial lots will be included in the previous lot if less than one-half the size of a normal lot. If greater than one-half the normal lot size, it will be tested as a separate lot.”

### SPECIAL PROVISION SECTION 502 STRUCTURAL CONCRETE

502.0502 Quality Assurance Method A - Rejection by Resident Change the first sentence to read: “For an individual subplot with test results failing to meet the criteria in Table #1, or if the calculated pay factor for Air Content is less than 0.80.....”

502.0503 Quality Assurance Method B - Rejection by Resident Change the first sentence to read: “For material represented by a verification test with test results failing to meet the criteria in Table #1, the Department will.....”

502.0505 Resolution of Disputed Acceptance Test Results Combine the second and third sentence to read: “Circumstances may arise, however, where the Department may .....”

**SPECIAL PROVISION SECTION 504**  
**REINFORCING STEEL**

504.18 Plates for Fabricated Members Change the second paragraph, first sentence from: "...ASTM A 898/A 898 M..." to "...ASTM A 898/A 898 M or ASTM A 435/A 435 M as applicable and..."

**SPECIAL PROVISION SECTION 535**  
**PRECAST, PRESTRESSED CONCRETE SUPERSTRUCTURE**

535.02 Materials Change "Steel Strand for Concrete Reinforcement" to "Steel Strand." Add the following to the beginning of the third paragraph; "Concrete shall be Class P conforming to the requirements in this section. 28 day compressive strength shall be as stated on the plans. Coarse aggregate...."

535.26 Lateral Post-Tensioning Replace the first paragraph; "A final tension..." with "Overstressing strands for setting losses cannot be accomplished for chuck to chuck lengths of 7.6 m [25 ft] and less. In such instances, refer to the Plans for all materials and methods. Otherwise, post-tensioning shall be in accordance with PCI standards and shall provide the anchorage force noted in the Plans. The applied jacking force shall be no less than 100% of the design jacking force."

**SPECIAL PROVISION SECTION 604**  
**MANHOLES, INLETS, AND CATCH BASINS**

604.02 Materials Add the following:

"Tops and Traps	712.07
Corrugated Metal Units	712.08
Catch Basin and Manhole Steps	712.09"

**SPECIAL PROVISION SECTION 615**  
**LOAM**

615.02 Materials Make the following change:

<u>Organic Content</u>	<u>Percent by Volume</u>
Humus	"5% - 10%", as determined by Ignition Test

## SPECIAL PROVISION SECTION 618 SEEDING

618.01 Description Change the first sentence to read as follows: “This work shall consist of furnishing and applying seed .....” Also remove “,and cellulose fiber mulch” from 618.01(a).

618.03 Rates of Application In 618.03(a), remove the last sentence and replace with the following: “These rates shall apply to Seeding Method 2, 3, and Crown Vetch.”

In 618.03(c) “1.8 kg [4 lb]/unit.” to “1.95 kg [4 lb]/unit.”

618.09 Construction Method In 618.09(a) 1, sentence two, replace “100 mm [4 in]” with “25 mm [1 in] (Method 1 areas) and 50 mm [2 in] (Method 2 areas)”

618.15 Temporary Seeding Change the Pay Unit from Unit to Kg [lb].

## SPECIAL PROVISION SECTION 620 GEOTEXTILES

620.03 Placement Section (c)

Title: Replace “Non-woven” in title with “Erosion Control”.

First Paragraph: Replace first word “Non-woven” with “Woven monofilament”.

Second Paragraph: Replace second word “Non-woven” with “Erosion Control”.

620.07 Shipment, Storage, Protection and Repair of Fabric Section (a)

Replace the third sentence with the following: “Damaged geotextiles, as identified by the Resident, shall be repaired immediately.”

620.09 Basis of Payment

Pay Item 620.58: Replace “Non-woven” with “Erosion Control”

Pay Item 620.59: Replace “Non-woven” with “Erosion Control”

## SPECIAL PROVISION SECTION 626 HIGHWAY SIGNING

626.034 Concrete Foundations Add to the following to the end of the second paragraph: “Pre-cast and cast-in-place foundations shall be warranted against leaning and corrosion for two years after the project is completed. If the lean is greater than 2 degrees from normal or the foundation is spalling within the first two years, the Contractor shall replace the foundation at no extra cost.”

**SPECIAL PROVISION SECTION 637**  
**DUST CONTROL**

**637.06 Basis of Payment** Add the following after the second sentence of the third paragraph: “Failure by the Contractor to follow Standard Specification or Special Provision - Section 637 and/or the Contractor’s own Soil Erosion and Pollution Control Plan concerning Dust Control and/or the Contractor’s own Traffic Control Plan concerning Dust Control and/or visible evidence of excessive dust problems, as determined by the Resident, will result in a reduction in payment, computed by reducing the Lump Sum Total by 5% per occurrence per day. The Department’s Resident or any other representative of the Department reserves the right to suspend the work at any time and request a meeting to discuss violations and remedies. The Department shall not be held responsible for any delay in the work due to any suspension under this item. Additional penalties may also be assessed in accordance with Special Provision 652 - Work Zone Traffic Control and Standard Specification 656 - Temporary Soil Erosion and Water Pollution Control.”

**SPECIAL PROVISION SECTION 652**  
**MAINTENANCE OF TRAFFIC**

**652.8.2 Other Items** Replace the last paragraph with the following: “There will be no payment made under any 652 pay items after the expiration of the adjusted total contract time.”

**SPECIAL PROVISION SECTION 656**  
**TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL**

**656.5.1 If Pay Item 656.75 Provided** Replace the second paragraph with the following: “Failure by the Contractor to follow Standard Specification or Special Provision - Section 656 and/or the Contractor’s own Soil Erosion and Pollution Control Plan will result in a reduction in payment, computed by reducing the Lump Sum Total by 5% per occurrence per day. The Department’s Resident or any other representative of the Department reserves the right to suspend the work at any time and request a meeting to discuss violations and remedies. The Department shall not be held responsible for any delay in the work due to any suspension under this item.”

**SPECIAL PROVISION SECTION 703**  
**AGGREGATES**

**703.22 Underdrain Backfill Material** Change the first paragraph from “...for Underdrain Type B...” to “...for Underdrain Type B and C...”

**SPECIAL PROVISION SECTION 709**  
**REINFORCING STEEL AND WELDED STEEL WIRE FABRIC**

709.03 Steel Strand Change the second paragraph from "...shall be 12mm [½ inch] AASHTO M203M/M203 (ASTM A416/A416M)..." to "...shall be 15.24 mm [0.600 inch] diameter AASHTO M203 (ASTM A416)..."

**SPECIAL PROVISION SECTION 712**  
**MISCELLANEOUS HIGHWAY MATERIALS**

Add the following:

"712.07 Tops, and Traps These metal units shall conform to the plan dimensions and to the following specification requirements for the designated materials.

Gray iron castings shall conform to the requirements of AASHTO M105, Class 30, unless otherwise designated.

Carbon steel castings shall conform to the requirements of AASHTO M103/M103M. Grade shall be 450-240 [65-35] unless otherwise designated.

Structural steel shall conform to the requirements of AASHTO M183/M183M or ASTM A283/A283M, Grade B or better. Galvanizing, where specified for these units, shall conform to the requirements of AASHTO M111.

712.08 Corrugated Metal Units The units shall conform to plan dimensions and the metal to AASHTO M36/M36M. Bituminous coating, when specified, shall conform to AASHTO M190 Type A.

712.09 Catch Basin and Manhole Steps Steps for catch basins and for manholes shall conform to ASTM C478M [ASTM C478], Section 13 for either of the following material:

- (a) Aluminum steps- ASTM B221M, [ASTM B211] Alloy 6061-T6 or 6005-T5.
- (b) Reinforced plastic steps Steel reinforcing bar with injection molded plastic coating copolymer polypropylene. Polypropylene shall conform to ASTM D 4101.

712.23 Flashing Lights Flashing Lights shall be power operated or battery operated as specified.

- (a) Power operated flashing lights shall consist of housing, adapters, lamps, sockets, reflectors, lens, hoods and other necessary equipment designed to give clearly visible



signal indications within an angle of at least 45 degrees and from 3 to 90 m [10 to 300 ft] under all light and atmospheric conditions.

Two circuit flasher controllers with a two-circuit filter capable of providing alternate flashing operations at the rate of not less than 50 nor more than 60 flashes per minute shall be provided.

The lamps shall be 650 lumens, 120 volt traffic signal lamps with sockets constructed to properly focus and hold the lamp firmly in position.

The housing shall have a rotatable sun visor not less than 175 mm [7 in] in length designed to shield the lens.

Reflectors shall be of such design that light from a properly focused lamp will reflect the light rays parallel. Reflectors shall have a maximum diameter at the point of contact with the lens of approximately 200 mm [8 in].

The lens shall consist of a round one-piece convex amber material which, when mounted, shall have a visible diameter of approximately 200 mm [8 in]. They shall distribute light and not diffuse it. The distribution of the light shall be asymmetrical in a downward direction. The light distribution of the lens shall not be uniform, but shall consist of a small high intensity portion with narrow distribution for long distance throw and a larger low intensity portion with wide distribution for short distance throw. Lenses shall be marked to indicate the top and bottom of the lens.

(b) Battery operated flashing lights shall be self-illuminated by an electric lamp behind the lens. These lights shall also be externally illuminated by reflex-reflective elements built into the lens to enable it to be seen by reflex-reflection of the light from the headlights of oncoming traffic. The batteries must be entirely enclosed in a case. A locking device must secure the case. The light shall have a flash rate of not less than 50 nor more than 60 flashes per minute from minus 30 °C [minus 20 °F] to plus 65 °C [plus 150 °F]. The light shall have an on time of not less than 10 percent of the flash cycle. The light beam projected upon a surface perpendicular to the axis of the light beam shall produce a lighted rectangular projection whose minimum horizontal dimension shall be 5 degrees each side of the horizontal axis. The effective intensity shall not have an initial value greater than 15.0 candelas or drop below 4.0 candelas during the first 336 hours of continuous flashing. The illuminated lens shall appear to be uniformly bright over its entire illuminated surface when viewed from any point within an angle of 9 degrees each side of the vertical axis and 5 degrees each side of the horizontal axis. The lens shall not be less than 175 mm [7 in] in diameter including a reflex-reflector ring of 13 mm [½ in] minimum width around the periphery. The lens shall be yellow in color and have a minimum relative luminous transmittance of 0.440 with a luminance of 2854° Kelvin. The lens shall be one-piece construction. The lens material shall be plastic and meet the luminous transmission requirements of this specification. The case containing the batteries and

circuitry shall be constructed of a material capable of withstanding abuse equal to or greater than 1.21 mm thick steel [No. 18 U.S. Standard Gage Steel]. The housing and the lens frame, if of metal shall be properly cleaned, degreased and pretreated to promote adhesion. It shall be given one or more coats of enamel which, when dry shall completely obscure the metal. The enamel coating shall be of such quality that when the coated case is struck a light blow with a sharp tool, the paint will not chip or crack and if scratched with a knife will not powder. The case shall be so constructed and closed as to exclude moisture that would affect the proper operation of light. The case shall have a weep hole to allow the escape of moisture from condensation. Photoelectric controls, if provided, shall keep the light operating whenever the ambient light falls below 215 lx [20 foot candles]. Each light shall be plainly marked as to the manufacturer's name and model number.

If required by the Resident, certification as to conformance to these specifications shall be furnished based on results of tests made by an independent testing laboratory. All lights are subject to random inspection and testing. All necessary random samples shall be provided to the Resident upon request without cost to the Department. All such samples shall be returned to the Contractor upon completion of the tests.

712.32 Copper Tubing Copper tubing and fittings shall conform to the requirements of ASTM B88M Type A [ASTM B88, Type K] or better.

712.33 Non-metallic Pipe, Flexible Non-metallic pipe and pipe fittings shall be acceptable flexible pipe manufactured from virgin polyethylene polymer suitable for transmitting liquids intended for human or animal consumption.

712.34 Non-metallic Pipe, Rigid Non-metallic pipe shall be Schedule 40 polyvinylchloride (PVC) that meets the requirement of ASTM D1785. Fittings shall be of the same material.

712.341 Metallic Pipe Metallic pipe shall be ANSI, Standard B36.10, Schedule 40 steel pipe conforming to the requirements of ASTM A53 Types E or S, Grade B. End plates shall be steel conforming to ASTM A36/A36M.

Both the sleeve and end plates shall be hot dip galvanized. Pipe sleeve splices shall be welded splices with full penetration weld before galvanizing.

712.35 Epoxy Resin Epoxy resin for grouting or sealing shall consist of a mineral filled thixotropic, flexible epoxy resin having a pot life of approximately one hour at 10°C [50°F]. The grout shall be an approved product suitable for cementing steel dowels into the preformed holes of curb inlets and adjacent curbing. The sealant shall be an approved product, light gray in color and suitable for coating the surface.

712.36 Bituminous Curb The asphalt cement for bituminous curb shall be of the grade required for the wearing course, or shall be Viscosity Grade AC-20 meeting the current requirements of Subsection 702.01 Asphalt Cement. The aggregate shall conform to the requirements of Subsection 703.07. The coarse aggregate portion retained on the 2.36 mm [No. 8] sieve may be either crushed rock or crushed gravel.

The mineral constituents of the bituminous mixture shall be sized and graded and combined in a composite blend that will produce a stable durable curbing with an acceptable texture. Bituminous material for curb shall meet the requirements of Section 403 - Hot Bituminous Pavement.

712.37 Precast Concrete Slab Portland cement concrete for precast slabs shall meet the requirements of Section 502 - Structural Concrete, Class A.

The slabs shall be precast to the dimension shown on the plans and cross section and in accordance with the Standard Detail plans for Concrete Sidewalk Slab. The surface shall be finished with a float finish in accordance with Subsection 502.14(c). Lift devices of sufficient strength to hold the slab while suspended from cables shall be cast into the top or back of the slab.

712.38 Stone Slab Stone slabs shall be of granite from an acceptable source, hard, durable, predominantly gray in color, free from seams which impair the structural integrity and be of smooth splitting character. Natural color variations characteristic of the deposit will be permitted. Exposed surfaces shall be free from drill holes or indications of drill holes. The granite slabs in any one section of backslope must be all the same finish.

The granite slabs shall be scabble dressed or sawed to an approximately true plane having no projections or depressions over 13 mm [½ in] under a 600 mm [2 ft] straightedge or over 25 mm [1 in] under a 1200 mm [4 ft] straightedge. The arris at the intersection of the top surface and exposed front face shall be pitched so that the arris line is uniform throughout the length of the installed slabs. The sides shall be square to the exposed face unless the slabs are to be set on a radius or other special condition which requires that the joints be cut to fit, but in any case shall be so finished that when the stones are placed side by side no space more than 20 mm [¾ in] shall show in the joint for the full exposed height.

Liftpin holes in all sides will be allowed except on the exposed face.

### SPECIAL PROVISION SECTION 717 ROADSIDE IMPROVEMENT MATERIAL

717.05 Mulch Binder. Change the third sentence to read as follows:

“Paper fiber mulch may be used as a binder at the rate of 2.3 kg/unit [5 lb/unit].”

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**SECTION 16000**  
**GENERAL ELECTRICAL CONDITIONS**

**PART 1 GENERAL**

- NOTE:
1. The word "Owner" when used in the Electrical Specification shall refer to Maine Department of Transportation.
  2. The words "Electrical Engineer" when used in the Electrical Specification shall refer to Electrical Design Consultants.
  3. The word "provide" when used in the Electrical Specification and Electrical Drawing Notes shall mean to furnish and install.
  4. The word "furnish" when used in the Electrical Specification and Electrical Drawing Notes shall mean that the Contractor is to purchase equipment but not install the equipment.
  5. The word "install" when used in the Electrical Specification or Electrical Drawing Notes shall mean that the Contractor is to install equipment but not purchase the equipment.

**1.01 SCOPE**

- A. The phrase "Electrical Work" and the "scope of the Electrical Work" shall mean and is intended to include the providing of all labor, material, and equipment to satisfactorily accomplish the installation and tests described or referenced on the Electrical Drawings or in this Electrical Specification.
- B. As a minimum, all Electrical Work will be accomplished in accordance with the most recent edition or revision of the National Electrical Code, NFPA-70. No electrical construction requirements for this project, which are also requirements of the National Electrical Code, will be repeated on the project's Electrical Drawings or in the Electrical Specification. There will be no further reference to specific aspects of the National Electrical Code throughout the Electrical Drawings and Electrical Specification except that:
  1. All requirements on the Electrical Drawings or in the Electrical Specifications which appear to allow electrical work that is in violation of the National Electrical Code shall be considered to be errors or omissions on the Electrical Drawings or in the Electrical Specification. The Contractor shall include in the bid for this work all costs to complete the work in accordance with the National Electrical Code regardless of these errors or omissions.
  2. All requirements on the Electrical Drawings or in the Electrical Specification which are more restrictive than the National Electrical Code and/or are in addition to the minimum requirements of the National Electrical Code are intended to be requirements over and above those of the National Electrical Code and are to be accomplished as described.
  3. Utility requirements which are more restrictive than the National Electrical Code and/or more restrictive than the Electrical Drawings and Specifications are considered to be project requirements in addition to the National Electrical Code and the Electrical Drawings and Specifications.
  4. Conflicts between the requirements of the National Electrical Code and requirements of

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any other applicable building code, utility requirements, or local ordinance shall be resolved in favor of the National Electrical Code unless the conflicting code or requirement specifically states that it is to supersede the National Electrical Code.

5. Discrepancies between the Electrical Engineer's drawings and specifications and the drawings and specifications of the Landscape Architect, the Project Architect, the Civil Engineer, the Structural Engineer, and the Mechanical Engineer shall be resolved by the Electrical Engineer. The Electrical Engineer's resolution shall take the form of a review of the project documents and a determination of details of the Electrical Work to be provided that is most appropriate for the project without regard to the relative construction cost associated with other possible determinations. If construction costs associated with other possible determinations are greater than the construction cost associated with the Electrical Engineer's determination, then a credit will be due from the Contractor to the owner for the difference between the most expensive possible determination and the Electrical Engineer's determination.
- C. In addition to the requirements of the General, Special, and Supplementary conditions of the project's other specification sections and contract documents, the Electrical Specification includes the following sections:

16000	General Electrical Conditions
16010	Test Requirements
16020	Shop Drawing Submittals
16030	Fire Rated Penetrations
16040	Demolition and Waste Disposal
16111	Conduit
16120	Conductors, Cables & Connectors
16131	Pull and Junction Boxes
16133	Enclosures and Wireways
16134	Outlet and Device Boxes
16141	Light Switches
16145	Receptacles
16147	Cover Plates
16155	Motor Starters
16190	Supporting Devices
16402	Undgr. Elec. Feed. & Br. Circuits
16430	Metering
16450	Grounding
16455	Earth Grounding
16474	Panelboards & Switchboards
16477	Safety Switches & Disconn. Means
16501	Lamps
16502	Ballasts and Accessories
16503	Poles and Standards
16510	Interior Building Lighting
16520	Exterior Building Lighting
16530	Site Lighting

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16580  
16721

Emergency Lighting  
Fire Alarm System

**1.02 ELECTRICAL SAFETY**

- A. The Contractor shall enforce industry standard safe electrical practices and procedures including contained in the listed referenced in Paragraph 1.07.

**1.03 EXAMINATION OF SITE AND CONTRACTUAL DOCUMENTS**

- A. Before submitting bid and beginning any work, it is understood and agreed that the Contractor is competent to provide the type of Electrical Work shown on the Electrical Drawings and Specifications and has become aware of all Electrical Work required for the satisfactory completion of this project by careful examination of all the project's drawings and specifications, the work site and related contract documents.

**1.04 CONTRACTOR'S WARRANTIES**

- A. The Contractor warrants that all Electrical Work shall be free from defects.
- B. Any defective Electrical Work shall be repaired by the Contractor without cost to the Owner or the Electrical Engineer. This repair cost shall include any direct or indirect damages resulting from the failure or the repair of the Electrical Work.
- C. The Contractor agrees to indemnify, defend, and hold harmless the Owner and the Electrical Engineer from and against all loss or expense (including costs and Attorney's fees) by reason of liability imposed by law upon the Owner or the Electrical Engineer for damages because of bodily injury, including death at anytime arising therefrom, sustained by any person or persons or on account of damage to property, including loss of use thereof, arising out of or in consequence of the performance of the contract, provided such injury to persons or damage to property is due or claimed to be due to the negligence of the Contractor, his employees or agents.
- D. The Contractor warrants that there has been no collusion with the Electrical Engineer or anyone from the office of the Electrical Engineer.
- E. The Contractor warrants that he has not been influenced by any oral statement or promise of the Electrical Engineer, but only by these Contract Documents.
- F. The Contractor warrants that he is qualified and authorized to do work in the State of Maine and is familiar with all general and special laws, ordinances, and regulations that may affect the work, its performance, or those persons employed therein.

**1.05 CLEAN-UP**

- A. At the completion of each workday, the area shall be left "broom" clean. At the completion of the project there shall be no Electrical Work debris left at the site.

**1.06 DRAWINGS AND SPECIFICATIONS**

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- A. The Drawings and Specifications are complementary each to the other and the work required by either shall be included in the Contract as if called for by both. All conflicting directions between Drawings and Specifications shall be resolved by requiring the more restrictive direction be followed.
- B. All work shown on the Drawings is intended to be approximately correct to the scale of the Drawings, but figured dimensions and detailed Drawings are in all cases to assume precedence over them. Where differences exist between two or more descriptions of work to be accomplished, the more detailed description shall be followed.
- C. The Electrical Drawings are diagrammatic and are not intended to show every detail of construction or the exact location of equipment. Where building construction makes it advisable or necessary to change the location of equipment, the Contractor shall perform such work without additional cost to the Owner, Architect, or the Electrical Engineer for the project. Any doubt as to the intended location of equipment shall be resolved by the Electrical Engineer before proceeding with the installation.
- D. Details and information not customarily shown on Electrical Drawings or described in Electrical Specifications, which are, however, necessary for the proper installation and operation of the project's systems and equipment or required to meet applicable codes shall be included in the Contractor's price the same as if herein specified and shown.
- E. The intent of Drawings and Specifications is to obtain an electrical installation of all systems, complete in every detail and with all electrical systems properly interconnected. The Electrical Contractor shall provide all such parts as may be necessary to complete the systems in accordance with the highest quality of industry standards and to the satisfaction of the Electrical Engineer. Upon completion, the electrical systems and all equipment throughout the project shall operate safely, satisfactorily and function as intended.
- F. In any discrepancy between requirements of the Drawings and Specifications, the Electrical Engineer shall resolve the discrepancy.
- G. If the Contractor discovers any error or omission in the Drawings or Specifications or in the work undertaken and performed by him, he shall immediately notify the Electrical Engineer and the latter shall promptly investigate the matter and provide instruction for the correction thereof.
- H. The locations of existing and proposed underground utilities, if shown, are shown in an approximate way only. The Contractor shall determine the exact locations of all existing underground utilities before commencing work. The Contractor agrees to be fully responsible for any and all damages which might be occasioned by his failure to locate and preserve existing underground utilities exactly.

**1.07 CODES, STANDARDS, INSPECTIONS AND FEES**

- A. All Electrical work shall be in accordance with the most recent edition or revision of the following documents. (Note: See paragraph 1.01B in addition to requirements below.)
  - 1. NFPA 101 (Life Safety Code).
  - 2. NFPA-72 (National Fire Alarm Code)

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3. NFPA-70 (National Electrical Code)
4. ANSI C2 (National Electrical Safety Code).
5. Underwriters Laboratory detailed requirements for installation of listed material and equipment published in their documents titled:
  - a. Electrical Construction Materials Directory.
  - b. General Information for Electrical Construction, Hazardous Location, and Electrical Heating and Air Conditioning Equipment.
  - c. Fire Resistance Directory.
  - d. Electrical Appliance and Utilization Equipment Directory.
  - e. Fire Protection Equipment Directory.
  - f. Hazardous Location Equipment Directory.
6. OSHA 2079 Vol. III (Construction Industry Standards).
7. OSHA Standards contained in the Code of Federal Regulations # 1926 Subparts S and K.
8. NFPA-241 (Safeguarding construction, alteration, and demolition operations.)
9. BOCA (National Building Code).
10. Local Utility Requirements.
11. Local Building Codes.
- B. In case of differences between any of the requirements in paragraph A above, as applied to this project, the most restrictive shall govern.
- C. Where Drawings and Specifications indicate work in addition to the above requirements, the Drawings and Specifications shall be followed.
- D. All Utility installation and connection fees and fees for permits and inspections shall be included in the Contractor's bid.
- E. The Contractor shall include in his bid all costs to bring utilities into the project that are not paid for by the utility. This includes but is not limited to such utility charges as transformer installation costs, "excess costs" for underground service, new pole locations, and easements.
- F. The Contractor shall be responsible for the timely notification of the Authority Having Jurisdiction in order



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that required inspections of Electrical Work may be accomplished.

- G. The Contractor shall submit a letter to the Electrical Engineer stating that the Electrical Work has satisfactorily passed inspection by the Authority Having Jurisdiction.

**1.08 DIMENSIONS AND COORDINATION**

- A. The Contractor is responsible to verify field dimensions and coordinate Electrical Work with that of other trades.

**1.09 PHASED CONSTRUCTION**

- A. The construction work is accomplished in phases. The Contractor shall include in his bid all additional costs associated with phased construction which will require unusual scheduling problems, rework, and extended construction time.

**1.10 TEMPORARY ELECTRICAL SERVICES**

- A. The Contractor shall provide temporary electrical outlet receptacles totaling one every 900 square feet or part thereof of work area. These receptacles shall be GFCI type 20 Ampere, 120 Volt receptacles or they shall be *protected by ground fault circuit interrupter circuit breakers.*
- B. The Contractor shall provide temporary lighting such that no point in any area where construction is underway shall have less than 20 foot-candles on the floor.
- C. The Contractor shall provide all stairways and means of egress from buildings under demolition, erection, construction, or repair with illumination to at least 3 footcandles under normal conditions and 1 footcandle *under emergency power conditions.* Emergency power provided for illuminating the stairway and means of egress to a minimum of 1 footcandle shall have the capacity to maintain that level of illumination for 1 hour.
- D. The Contractor shall remove all temporary wiring, lighting, receptacles and other temporary material before the project is substantially complete.
- E. Temporary lights, power wiring, receptacles and heat shall be provided for temporary construction office spaces.
- F. The electric power consumed prior to Substantial Completion of the Project shall be paid for by the Contractor. No temporary electric resistance heaters will be allowed.
- G. Temporary fire alarm pull stations and horn lights shall be provided for manual alarm initiation and alarm throughout the project during construction. At end of each work shift, connect temporary smoke detectors on each floor and each major area of the building. *Install one temporary exterior 8" weatherproof bell.* Submit shop drawing of proposed system within two weeks after award of contract.

**1.11 MATERIALS AND EQUIPMENT**

- A. All materials and equipment provided as part of this project shall be new, undamaged and shall be "listed and

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labeled" for the use herein intended as defined in the National Electrical Code.

- B. Samples of materials and equipment shall be submitted to the Electrical Engineer for his review if requested.

**1.12 MATERIAL SAFETY DATA SHEET (MSDS)**

- A. The Contractor shall request the U.S. Department of Labor (OSHA) Material Safety Data Sheet (MSDS) for every component of electrical material provided as part of this project. All MSDS for the project shall be assembled alphabetically in a 3-ring binder and given to the Electrical Engineer prior to substantial completion.
- B. The Contractor shall provide a letter to the Electrical Engineer stating that all the MSDS available for equipment and material used on this Project are included in the 3-ring binder.

**1.13 AS-BUILT RECORD DRAWINGS**

- A. The Contractor shall keep on the job at all times, one complete set of Drawings and Specifications of the Electrical Work, on which shall be neatly and accurately noted any of the project's Electrical Work that is provided other than as shown on the Drawings or described in the Specifications. Such deviations from the Drawings and Specifications shall be noted with explanation.
- B. At the conclusion of the Project, the Contractor shall prepare Record Drawings based upon as-built conditions. Every deviation from the Project's Drawings and Specifications shall be detailed. These Record Drawings shall be of the same quality as the original Project drawings.
- C. Provide the tie point dimensions from building structural features to the ground rod locations.
- D. Show as-built location of all underground electrical conduits on both the Electrical Site drawings and the project's Civil Engineering drawing.
- E. As-built record drawings shall be submitted to the Electrical Engineer prior to the Electrical Engineer's final "punch list" review of the project.
- F. If accurate record drawings are not provided by the Contractor at the time of substantial completion, the record drawings shall be prepared by the Electrical Engineer and the cost to the Electrical Engineer to prepare these record drawings shall be paid out of the contractor's retainer.

**1.14 EQUIPMENT IDENTIFICATION**

- A. Provide black and white laminated plastic name plates attached with sheet metal screws and having 1/4 inch tall engraved letters identifying each piece of equipment listed below:
1. Motor Starters.
  2. Disconnect Switches.
  3. Remote Control Switches.

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4. Power or Lighting Panels.
5. Outlet Receptacle Wall Plates in Health Care Facilities.

**1.15 MAINTENANCE INFORMATION**

- A. The Contractor shall furnish all necessary assistance and instruction to properly train the Owner's authorized personnel in the operation and care of the electrical systems.
- B. The Contractor shall furnish a complete set of electrical shop drawings and operating and maintenance manuals for all electrical equipment to the Owner.
- C. The Contractor shall submit name, address and telephone number of the Manufacturer's representative and service company for each piece of electrical equipment for service and spare parts.

**1.16 DEPARTURE FROM ELECTRICAL DRAWINGS AND SPECIFICATIONS**

NOTE: Requests for departures from the *Electrical Drawings and Specifications* will be processed in the same manner as any Design-Build portion of the project. See Section 16050 for details regarding submission of Design-Build material for review by the Electrical Engineer.

- A. No departure from the Electrical Drawings or these Specifications will be allowed without written request and a copy of the revised electrical drawing from the Contractor. A written request for departure from the Electrical Drawings and Specifications shall include all changes in project cost and effect on project completion schedule associated with the request. All decisions will be in writing from the office of the Electrical Engineer within five days after receipt of the written request for departure from the Contractor.
- B. Any departure from the Electrical Drawings or from these Specifications which does not have the written approval of the Electrical Engineer may, at the discretion of the Electrical Engineer, have to be reworked at the expense of the Contractor.
- C. No payments for work and material in addition to that included in the scope of the Electrical Drawings or these Specifications, "extras", will be allowed unless the additional work and material is approved in writing by the Electrical Engineer and the cost to the Owner for this "extra" is included in the approval. The amount of the "extra" shall not exceed an estimate based upon the current edition of Means Electrical Cost Data.
- D. Departures from the Electrical Plans and Specifications which result in the Contractor not having to perform work or provide material which was included in the scope of these documents shall be accompanied by a reduction in payments, "credits", for the Owner. The value of the work not performed and/or the material not provided, "credit", shall be based upon the current edition of Means Electrical Cost Data.
- E. The Contractor shall be responsible to have the Authorities Having Jurisdiction (Electrical Inspector, Fire Prevention Officer, Fire Marshal, etc) review and approve the proposed deviation from the Electrical Drawing and Specifications originally submitted for construction permits. Additional permit fees shall be paid by the Contractor.

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- F. The Contractor shall be responsible to update bonding and construction insurance policies to account for the the changed conditions associated with the deviation from the original Electrical Drawings and Specifications.

**1.17 SUBSTANTIAL COMPLETION**

- A. Before a certificate of substantial completion, or its equivalent, is issued for work herein described, the Contractor shall submit a written statement to the Electrical Engineer stating that all Electrical Work and performance tests have been satisfactorily accomplished in accordance with the Drawings and Specifications.

**END OF SECTION 16000**

**SECTION 16010  
TEST REQUIREMENTS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Testing of project's systems and components.
- B. Test result documentation.
- C. A satisfactory operational test of all electrical systems both individually and interconnected with associated systems is required to prove satisfactory installation before final acceptance by the Electrical Engineer. The Contractor shall address a letter to the Electrical Engineer which states that all operational tests were completed and electrical systems functioned satisfactorily.
- D. The right is reserved by the Electrical Engineer to inspect and test any portion of the equipment or material during the progress of construction.
- E. No electrical work shall be concealed by back filling earth, sheet rocking walls, or any other means until the Electrical Engineer has had the opportunity to inspect the electrical work about to be concealed. The Electrical Engineer shall be given a three day notification of impending concealment.

**1.02 RELATED WORK**

**1.03 REFERENCES**

**PART 2 EQUIPMENT**

**2.01 TESTING**

- A. The Contractor shall provide all necessary instruments and equipment and make all tests, adjustments and trial operations required.

**PART 3 EXECUTION**

**3.01 CONDUCTOR AND BRANCH CIRCUIT TESTS**

- A. Verify with a continuity tester that phase conductors are not grounded prior to energizing the circuit for the first time.
- B. Verify that no current flows in grounding conductors when branch circuits are energized for the first time.

**3.02 RECEPTACLE TESTS**

- A. Every 125 Volt duplex type receptacle shall be tested with a receptacle wiring tester that detects errors of polarity and grounding.
- B. Every 125 Volt duplex type receptacle shall be tested to detect high resistance connections, excessive (over %5) full load voltage drop from service entrance to receptacle, and inadequate plug cap blade

**SECTION 16010**  
**TEST REQUIREMENTS**

retention.

- C. Ground fault circuit interrupter type receptacles shall be tested to assure that the trip level is not in excess of .005 Amperes.

**3.03 FLUSH WALL PLATE TEST**

- A. Cover plates for flush mounted light switches and receptacles shall be firmly mounted against the wall, ceiling or floor surface on all edges and corners. Using a piece of paper as a go no-go gauge, if the paper can be slid behind the cover plate at the corners, the installation is unacceptable and shall be repaired.

**3.04 GROUNDING**

- A. The adequacy of the service entrance grounding system shall be tested by measuring the ground resistance with an earth test megger as described in the National Electrical Code Handbook. The ground resistance shall not exceed 10 Ohms. Provide additional ground rods and conductors as needed.
- B. The ground rod(s) shall be tested before being covered with soil.
- C. Ground rods shall be tested prior to their connection to the grounding electrode conductor from the building's power distribution system.
- D. Record the weather condition and the soil moisture at the time of the ground rod testing.
- E. Provide tie points from an easily recognizable building structural feature to the ground rods and show the tie points on the as-built drawings.

**3.05 EMERGENCY LIGHTING SYSTEM**

- A. The emergency lighting system and exit signs shall be operated in the emergency mode for 90 minutes.
- B. At the end of the 90 minute test period, the Contractor shall measure the output voltage of battery operated systems at the battery. The battery voltage shall not be less than 87-1/2% of the starting voltage.
- C. The Contractor shall verify that the emergency light heads are aimed at the floor or stair so as to provide not less than the required illumination level over the means of egress in accordance with the Electrical Specification.

**3.06 FIRE ALARM SYSTEM**

- A. The Contractor shall include in his bid all costs to have the fire alarm system manufacturer's representative make a thorough inspection and operational test of the complete fire alarm system including all system components. The inspection shall be designed to ensure the following criteria have been met:

**SECTION 16010**  
**TEST REQUIREMENTS**

1. The complete system and the system's individual components shall be tested in accordance with Chapter 7 of the National Fire Alarm Code. The complete system and the system's individual components shall be proven to operate in accordance with the Project's drawings and specifications, the manufacturer's rated characteristics, and the National Fire Alarm Code;
2. Verify that all installation requirements associated with the UL listing for each component have been adhered to;
3. Verify that the system and its individual components have been provided in accordance with the manufacturer's requirements; and
4. Verify that the required supervisory features of the system function satisfactorily.

**3.07 LIGHTING SYSTEMS**

- A. The Contractor shall verify that the lighting system was provided in accordance with the Electrical Drawings and Specifications and manufacturer's detailed installation requirements.
- B. The Contractor shall test the installed system to verify that it functions as intended.

**3.08 PHASE ROTATION**

- A. The Contractor shall measure the phase rotation of three phase service entrance conductors and mark the front of the main service entrance disconnect with the rotation of phases A-B-C.
- B. The Contractor shall measure the phase rotation at every three phase motor and mark the motor junction box with the correct phase rotation for proper operation of the motor.

**3.09 REWORK**

- A. All project systems and system components shall be reworked until test results indicate that the specified criteria have been met and the system functions as intended.

**3.10 DOCUMENTATION**

- A. The Contractor shall address a letter to the Electrical Engineer which states that all specified tests have been accomplished, lists the test results, and states that all systems and components meet the specified criteria.
- B. After satisfactory completion of the fire alarm system tests specified above, a Fire Alarm System Record of Completion shall be completed in accordance with the National Fire Alarm Code and sent to the Electrical Engineer. System documentation shall be provided to the Electrical Engineer by the Contractor.

END OF SECTION 16010

## SECTION 16020 SUBMITTALS

### PART 1 GENERAL

#### 1.01 WORK INCLUDED

- A. Proposed Equipment and Material submittals.
- B. Material Safety Data Sheet.
- C. Demolition Material Recipient Qualifications.

### PART 2 SUBSTITUTIONS

- A. No substitution of material or equipment for that specified on the electrical drawings or in the specifications shall be allowed unless otherwise notes on the electrical drawings or this specification..
- B. The Contractor shall assume all responsibility for additional expenses resulting from every substitution. For additional details regarding departures from the Electrical Drawings and Specifications, see Section 16000, Paragraph 1.15.
- C. The Electrical Engineer reserves the right to change from the original specification to another specified material equipment or method if the originally specified material's character has been changed by the manufacturer without notice of change to the Electrical Engineer or applicable laws contradict the intent of this specification.

### PART 3 SUBMITTALS

- A. No shop drawings shall be submitted unless required by other sections of the Project Specifications.
- B. Electrical drawings, sketches, and shop drawings associated with the design phase of a Design-Build process shall be submitted in accordance with this Section and Section 16050.
- C. Where indicated in other sections of the Project Specifications that a submittal is required, the submittal procedure shall be as follows:
  - 1. The Contractor shall provide five sets of submittals.
  - 2. When proposed for review, submittals must bear a Contractor's stamp indicating that the submittal meets the requirements of the Project's drawings and specifications before being proposed for the Electrical Engineer's review. Without the Contractor's stamp, the submittals will be returned for correction.
  - 3. No consideration will be given to brochure or catalog information not specifically marked for and referenced to the Project's drawings or specifications.
  - 4. The submittal shall contain reference to specified manufacturers' catalog numbers which shall be qualified in writing if required to meet the product performance or characteristics described in the Project's drawings or specifications.



**SECTION 16020**  
**SUBMITTALS**

5. In the event that any specified manufacturer's part number has been superseded by a new number since the preparation of the Project's drawings and specifications, the new number shall be provided with the old catalog number noted on the submittal.
6. In any case where a written description or notes on the Project's drawings or specifications pertain to performance or the characteristics of equipment or hardware and these descriptions or notes conflict with the manufacturer's catalog number, the written description or notes on the Project's drawings or specifications shall take precedence. If the manufacturer is unable to modify the product, as described by the catalog number, to include the written description on the Project's drawings or specifications, then the product described by catalog number shall be considered unsatisfactory for use on this project.
7. All equipment and material submittals shall have a letter included with the submittal that lists the delivery lead time requirements for each item in the submittal. The delivery lead time is the number of CALENDAR days between the time the order for an item is placed with the distributor and the time the item can be delivered to the work site. No proposed item will be reviewed without its delivery lead time indicated.
8. Equipment and material proposals shall indicate all UL listings related to this project's intended application.
9. Equipment and material proposals shall include the Material Safety Data Sheet (MSDS).
10. The contractor shall submit a letter from the "disposal firm" that will accept the demolition materials from this project. For non-hazardous waste, the "disposal firm" shall be the next custodian of the demolition material even if this custodian is only a transportation firm. For hazardous waste, the "disposal firm" will include the transportation firm and final recipient of the hazardous waste. The letter required by this section will state that the firm in custody of demolition material is duly qualified. See Section 16040.

**PART 4 EXECUTION**

- A. No equipment or material associated with a required shop drawing shall be purchased or installed prior to written approval of that shop drawing from the project Electrical Engineer.
- B. All MSDS for this Project shall be assembled in a 3-ring binder. See General Conditions Section 16000, paragraph 1.12.

END OF SECTION 16020

**SECTION 16030**  
**FIRE RATED PENETRATIONS**

**1.01 WORK INCLUDED**

- A. Sealing electrical penetrations of fire rated walls, floors, and ceilings.
- B. Preserving ceiling fire ratings at recessed light fixtures.

**1.02 RELATED WORK**

- A. Conduits.
- B. Cables.
- C. Boxes.
- D. Wireways.
- E. Lighting.

**1.03 REFERENCES**

(Electrical work shall be in accordance with the most recent edition or revision of the following documents.)

- A. UL publication: "Electrical Construction Materials Directory".
- B. UL publication: "Electrical Appliance and Utilization Equipment Directory".
- C. UL publication: "General Information for Electrical Construction, Hazardous Location, and Electric Heating and Air Conditioning Equipment".
- D. UL publication: "Building Materials Directory".
- E. UL publication: "Fire Resistance Directory".
- F. NFPA 101: Life Safety Code.

**PART 2 MATERIAL**

**2.01 ACCEPTABLE MANUFACTURERS (For UL Listed Fire Rated Sealing Material Only)**

- A. 3M Company: "Fire Barrier" caulking, putty, and systems.
- B. Dow Corning: "RTV Silicone Foam" sealants.

**PART 3 EXECUTION**

**3.01 GENERAL**

**SECTION 16030**  
**FIRE RATED PENETRATIONS**

- A. The Contractor shall be responsible to determine the fire rating of every wall, ceiling and floor penetrated in the course of the project's Electrical Work.
- B. The Contractor shall be responsible to preserve the fire rating of every wall, ceiling and floor with regard to penetrations associated with the project's Electrical Work.

**3.02 INSTALLATION**

- A. All cables penetrating floors, ceilings or walls shall be provided in accordance with the UL listed fabrication details furnished by the manufacturer of the fire sealing material to maintain the fire rating.
- B. Alternate fire stopping methods are acceptable if they are in accordance with a method shown in the UL Fire Resistance Directory and UL Building Materials Directory.

**3.03 DEMOLITION**

- A. All existing penetrations affected by demolition of existing electrical system components shall be made to meet the requirements for new penetrations.

**END OF SECTION 16030**

**SECTION 16040**  
**DEMOLITION AND WASTE DISPOSAL**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Dis-assembly and removal of existing Electrical systems, equipment, components and material.
- B. Ownership retained by owner until released by owner.
- C. Disposal in accordance with all applicable laws.
- D. Electrical construction waste.

**1.02 RELATED WORK**

- A. All demolition work to be done in accordance with project specifications and owner requirements.

**1.03 REGULATORY REQUIREMENTS**

- A. The disposal of existing electrical systems, equipment, components and material shall be in accordance with all applicable Federal, State, and local community laws and ordinances.
- B. The disposal of electrical construction waste and material shall be in accordance with all applicable Federal, State, and local community laws and ordinances.

**1.04 SUBMITTALS**

- A. The contractor shall submit a letter detailing the disposal of and the recipient of non-hazardous electrical construction waste generated as part of this project.
- B. The contractor shall submit a letter from the transportation company and the final recipient of disposed electrical construction waste, and electrical equipment, components, and material which is considered hazardous waste stating that all persons and companies involved with this disposal are qualified to do this work.
- C. See Section 16020 for additional details.

**PART 2 PRODUCTS**

**2.01** The following list of electrical systems, equipment, components, and material is for guidance, only, and is not complete.

- A. Electric lighting lamps containing more than 0.2ppm of mercury or 5mg/l of lead are subject to all the laws pertaining to hazardous waste disposal. Some types of lamps included are fluorescent lamps, high pressure sodium lamps and mercury vapor lamps. (Note: Hazardous waste determination is not necessary if waste lamps are kept whole and intact and are delivered to a qualified lamp recycling facility.)
- B. All Ballasts containing PCB contaminated capacitors, are determined to be hazardous waste and shall

**SECTION 16040**  
**DEMOLITION AND WASTE DISPOSAL**

be disposed of in accordance with the requirements of the U.S. EPA Regulations. These regulations state that any ballast manufactured through 1979 contains PCBs/ Any ballast manufactured after 1979 which is not labeled "NO PCBs" shall be assumed to contain PCBs. Ballasts containing PCBs shall be packed in 55 gallon drums, trucked via licensed interstate hazardous waste carrier, and delivered to an EFP approved ballast recycling service. (Closest listed recycling services are: Eastern Environmental Technologies (203)-856-2014; Ensquare Incorporated (617)-969-9238; and FulCircle Ballast Recyclers (617)-876-2229). More detailed information may be obtained from the EPA in Portland, Maine (207)-822-6300. Provide the owner with complete documentation tracing disposal site and acceptance by approved hazardous waste disposal facility. Provide a copy of all documentation to the Electrical Engineer.

- C. Exit signs employing self luminous components containing Tritium gas are considered to be hazardous waste. These exit signs shall be returned to the manufacturer for disposal in accordance with the instructions provided by the manufacturer located inside the exit sign. If that instruction is missing, the contractor shall be responsible to contact Department of Environmental Protection and dispose of these exit signs in accordance with all applicable state and federal requirements. Regardless of the disposal method, the contractor shall provide a letter to the owner with a copy to the Electrical Engineer that details the disposal method. See Section 16020 for additional requirements.
- D. Smoke detectors contain radio active material shall be considered hazardous waste. These smoke detectors shall be returned to the manufacturer located inside the detector. If that instruction is missing, the contractor shall be responsible to contact Department of Environmental Protection and dispose of these smoke detectors in accordance with all applicable state and federal requirements. Regardless of the disposal method, the contractor shall provide a letter to the owner with a copy to the Electrical Engineer that details the disposal method. See Section 16020 for additional requirements.
- E. Copper and aluminum wiring released by the owner to the contractor for disposal shall be recycled. The contractor shall deliver this wiring to a facility for recycling. The salvage value of these materials shall be retained by the contractor. The contractor shall provide a letter to the owner, with a copy to the Electrical Engineer, that details the disposition of copper and aluminum wiring removed from this project.

**PART 3 EXECUTION**

- A. Electrical service to the building and electrical power to the area undergoing demolition shall be reduced to a minimum, and the identity of energized circuits shall be ensured to avoid any uncertainty.
- B. All electric demolition materials shall remain the property of the owner until the owner or a representative of the owner releases the material to the contractor. When the demolition material is released to the contractor, it shall be removed from the site immediately and disposed in accordance with this specification.
- C. Electrical construction waste shall be removed from the site in accordance with this Section of the Electrical Specification.

**END OF SECTION 16040**

## SECTION 16111 CONDUIT

### 1.01 WORK INCLUDED

- A. Rigid Metal Conduit and Fittings.
- B. Intermediate Metal Conduit and Fittings.
- C. Electrical Metallic Tubing and Fittings.
- D. Flexible Metal Conduit and Fittings.
- E. Liquidtight Flexible Metal Conduit and Fittings.
- F. Rigid Non-Metallic Conduit and Fittings.
- G. Surface Mounted Metallic Wiremold.

### 1.02 RELATED WORK

- A. Cutting and Patching.
- B. Trenching: Excavation and Backfill for Conduit and Utilities on Site.
- C. Fire Rated Penetrations: See Section 16030.
- D. As-built conduit location drawings.

### 1.03 REFERENCES

- A. Applicable UL listing requirements.
- B. Applicable NEMA standards.

1.04 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020.

## PART 2 PRODUCTS

NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

## PART 3 EXECUTION

### 3.01 ELECTROLYSIS

- A. Do not bring dissimilar metals into contact with each other to prevent electrolysis. Where dissimilar metal contacts cannot be avoided, coat surfaces with corrosion inhibiting compound before assembling.

### 3.02 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

## SECTION 16111 CONDUIT

- A. Size conduit for Type THW insulated conductors, unless conduit size is otherwise specified on the Drawings.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
- D. Maintain minimum six inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations.
- F. Group conduit in parallel runs using conduit racks constructed of steel framing channel, threaded rods, and conduit straps or clamps. Provide space for 25 percent additional conduit.
- G. Do not fasten conduit with wire or perforated pipe straps. Remove all temporary conduit supports before conductors are pulled.

### 3.03 CONDUIT INSTALLATION

- A. Cut conduit square and de-burr cut ends.
- B. Use hydraulic one-shot conduit bender or elbows for bends in conduit larger than two inch trade size.
- C. Do not construct moisture traps in conduit runs. All conduit shall slope to drainage points.
- D. Use suitable conduit caps to protect empty conduit against entrance of dirt and moisture.
- E. Provide suitable pull wire in every empty conduit.
- F. Provide expansion fittings complete with grounding jumpers where conduits cross building expansion joints, where metal conduit straight run exceeds 200 feet, and where PVC conduit straight run exceeds 100 feet. Expansion couplings in metallic conduit shall have copper bonding conductors sized in accordance with the National Electrical Code Table 250-95.
- G. Make connections to motors and vibrating equipment with a minimum of 24 inches of flexible conduit. Minimum size 1/2 inch for motor connections. Use 3/8 inch flexible conduit only for fixture and control wiring.
- H. All Service Entrance conduit will have grounding bushings with plastic throats.
- I. All penetrations of building's exterior envelope shall be made weatherproof.
- J. Maximum size conduit in concrete slabs is 3/4 inch. Do not allow conduits to cross each other in slabs.

## SECTION 16111 CONDUIT

- K. Use steel elbows for bends in plastic conduit runs longer than 100 feet, or in plastic conduit runs which have more than the equivalent of two 90 degree bends, regardless of length. See Section 16402 for additional requirements.
- L. Wipe plastic conduit clean and dry before joining. Use conduit cleaning solvent before cementing joints. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum before moving conduit or pulling in conductors.
- M. Hazardous area wiring shall be in conduit with threaded fittings suitable for Class I, Division 1 and 2 atmospheres.
- N. All metal conduit shall be grounded but shall not be used as the grounding conductor.
- O. All conduit entering concentric knockouts shall be terminated in bonding bushings with bonding conductor.

### 3.04 CONDUIT INSTALLATION SCHEDULE

- A. Underground Installations More than Five Feet From Foundation Wall shall be Schedule 40 plastic conduit.
- B. Installations Under Concrete Slab, shall be Schedule 40 plastic conduit.
- C. Exposed Outdoor Locations shall be Intermediate Metal Conduit, (IMC).
- D. Exposed Interior Locations shall be Electrical Metallic Tubing unless otherwise noted on the Electrical Drawings or in more detailed parts of the Specification.
- E. Surface mounted raceways such as Walkermold and Wiremold shall be used only where detailed on the drawings.
- F. Plastic Conduit shall be converted to Rigid Metal Conduit before entering building through foundation wall or slab.
- G. No Plastic Conduit shall be used within the building.
- H. All Electrical wiring to boxes in masonry shall be in concealed Electrical Metallic Conduit.
- I. All under slab and underground conduits shall have a minimum slope of 1% down toward the source end.
- J. All under slab and underground conduits shall have a drain hole at the lowest point.
- K. Metallic conduit over 2" trade size shall be RMC unless otherwise noted on Electrical Drawings.
- L. Metallic conduit 2" trade size or smaller may be EMT unless otherwise noted on Electrical Drawings.

### 3.05 CONDUIT COLOR CODE



**SECTION 16111  
CONDUIT**

- A. Coat metallic conduits, prior to installation, with chip resistant enamel paint or 1/2" wide self-sticking marker tape at 3' intervals of the following colors:

1. Red: Conduits containing fire alarm system conductors.
2. Natural (no paint):  
Conduits containing 120/208 volt circuits except those on generator power.

**3.06 PULL WIRES**

- A. Provide pull wires in all empty conduits. Provide tags on each end of all pull wires giving location of other end.
- 3.07 Show as-built location of all electrical conduits installed underground outside the building and below the slab inside the building. The underground conduits outside the building shall be shown on both the Electrical Site drawing and the Civil Engineering site drawing. The conduits provided under the slab, inside the building, shall be shown on the Electrical Power Distribution Drawing.

**END OF SECTION 16111**

**SECTION 16120**  
**CONDUCTORS, CABLES, AND CONNECTORS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Conductors and Cables.
- B. Connector Hardware.

**1.02 RELATED WORK**

- A. Identification.
- B. Supports and Fasteners.
- C. Conduit Requirements: Section 16111.
- D. Fire Rated Penetrations: See Section 16030.
- E. Test Requirements: See Section 16010.

**1.03 SUBMITTALS** - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Firms regularly engaged in manufacture of electrical conductors, cables and connectors of types and ratings required, whose products have been in satisfactory use in similar service for not less than three years.

**2.02 MATERIALS**

- A. Conductor material (COPPER): Electrical conductors of 98% conductivity, annealed Copper shall be used throughout the project. Individual conductor insulation shall be type THWN, 600 Volts, and shall be UL listed and labeled for the use herein intended. Note: Conduits are sized based on THW insulation.
- B. Conductor material (ALUMINUM): NO ALUMINUM CONDUCTORS SHALL BE ALLOWED IN ANY APPLICATION ON THIS PROJECT, UNLESS SPECIFICALLY IDENTIFIED ON ELECTRICAL DRAWINGS.
- C. Individual branch circuit conductors shall not be smaller than AWG #12. Conductors shall have insulation rated at 600 Volts. The ampacity shall be sized at 60 degrees Centigrade.
- D. Fixture conductors shall not be smaller than AWG #12 with heat resistant thermoplastic rated for 600

**SECTION 16120**  
**CONDUCTORS, CABLES, AND CONNECTORS**

VAC and with a minimum operating temperature rating of 90 degrees Centigrade. See Section 16502 for ballast compartment wiring.

- E. Conductors sized AWG #10 and smaller shall be connected by either color coded twist-on spring loaded or color coded die compression type connectors.
- F. Conductors sized AWG #8 and larger shall be connected by either color coded die compression or bolted connectors.
- G. Connectors which pierce insulation as means of making contact with conductor SHALL NOT BE ALLOWED on conductors sized AWG #10 or smaller.
- H. Connectors which pierce insulation as means of making contact with conductor shall have the contact pressure maintained by steel nut and bolt.
- I. Exterior exposed wiring shall be in metallic conduit. Where the conduit is exposed to direct sun, the conductor insulation shall be type THHN.
- J. Individual THWN insulated conductors ampacity shall be sized at 60 degrees Centigrade through AWG #1 and at 75 degrees Centigrade where larger than AWG #1.
- K. All conductors and cables used on this project shall have an overall insulation rating of at least 600 VAC.
- L. Type MC cable shall be used for size AWG #10 & 12 branch circuits except where flexible metal conduit is specified. Do not use type MC for isolated ground branch circuits.
- M. All isolated ground branch circuits shall be constructed using hospital grade type AC or 4 conductor type NMB.
- N. Branch circuits larger than AWG #10 shall be type MC or individual conductors in electrical metallic tubing (EMT).

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Lace or clip together 3 phase groups of branch circuit conductors in distribution centers, panelboards, junction boxes, pullboxes and wireways. Do not tie parallel conductors together. Spread feeder conductors to allow amp probe current measurements.
- B. Provide only copper grounding electrode conductors, and straps. Provide copper clad steel grounding electrodes.
- C. Identify circuits in panelboards and load centers with permanent tags attached to conductors as they leave breaker or fuse lugs. This requirement is in addition to panel directory requirements of Section 16474.

**SECTION 16120**  
**CONDUCTORS, CABLES, AND CONNECTORS**

- D. Make conductor length for parallel feeders identical. Measure current sharing as described in Section 16010.
- E. Use wire pulling lubricant for pulling AWG #4 and larger wire. Lubricant shall be UL listed and labeled for the conductor insulation used.
- F. Pull wire into conduit only after nearby construction work is complete and after moisture and debris is removed from conduits.
- G. Color code conductors to designate grounding conductor, neutral conductor and phase conductors as follows:

120/208 Phase - A	Black
Phase - B	Red
Phase - C	Blue
Neutral	White
Ground	Green

480/277 Phase - A	Brown
Phase - B	Orange
Phase - C	Yellow
Neutral	Gray
Ground	Green

- H. Measure the phase rotation of the color coded conductors at the service entrance and at every three phase motor. Mark the phase rotation at the service entrance disconnect switch and at the junction box for every three phase motor.
- I. Pull conductors together where more than one is being pulled in a raceway.

END OF SECTION 16120

**SECTION 16131  
PULL AND JUNCTION BOXES**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Pullboxes.
- B. Junction Boxes.

**1.02 RELATED WORK**

- A. Section 16190: Supporting Devices.
- B. Fire Rated Penetrations: See Section 16030.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 MATERIALS**

- A. Pullboxes and Junction Boxes:
  - 1. Shall be of metal construction.
  - 2. Shall have screw on or hinged cover unless otherwise noted on Electrical Drawings.
  - 3. Waterproof boxes shall have bolted or hinged, and gasketed covers.
- B. Flush Mounted Pullboxes:
  - 1. Shall be of metal construction.
  - 2. Shall be provided with overlapping covers with flush-head cover retaining screws.

**2.02 ACCEPTABLE MANUFACTURERS**

- A. Junction and pullboxes used on this project shall be supplied only by Companies regularly employed in the manufacture of types and sizes required, whose products have been in satisfactory use in similar service for not less than three years.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Pullboxes and junction boxes exposed to the weather or in damp locations shall be weatherproof and

**SECTION 16131  
PULL AND JUNCTION BOXES**

have neoprene or silicon rubber gaskets. Silicon rubber gaskets shall be used with heat producing equipment.

- B. All box connectors and wire and cable clamping connectors shall be made of metal. No "push-in" nylon or rubber cable clamps are allowed.
- C. All enclosures exposed to the weather shall have a weep-hole at the lowest point to prevent the build up of condensation. This does not apply to explosion proof equipment.
- D. Where boxes are not sized on the Electrical Drawings, it shall be the Electrical Contractor's responsibility to provide a box sized in accordance with the associated wiring.

END OF SECTION 16131

**SECTION 16133**  
**ENCLOSURES AND WIREWAYS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Electrical Enclosures.

**1.02 RELATED WORK**

- A. Communications.
- B. Lighting Control Equipment.
- C. Power Control Equipment.
- D. Fire Rated Penetrations: See Section 16030.

- 1.03 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Manufacturer and Type: Use metal enclosure of the type and size shown or as required by Code if not sized on the drawing.

**2.02 MATERIALS**

- A. Cabinets: Metal construction, conforming to National Electrical Code prime coated and equipped with door, flush hinges, latch and lock assembly.
- B. Backboard: All electrical enclosures and wireways shall be mounted on 3/4 inch fir plywood, size to leave a minimum of 12 inch clear all around. Provide matte black painted finish on both sides.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Terminate conduit in enclosures and wireways with lock nut and bushing.
- B. Vacuum clean all cabinets at completion of project.
- C. All surface mounted cabinets shall be mounted on plywood backboards.
- D. Where boxes are not sized on the Electrical Drawings, it shall be the Electrical Contractor's responsibility to provide a box sized in accordance with the associated wiring.

**SECTION 16133  
ENCLOSURES AND WIREWAYS**

**END OF SECTION 16133**



**SECTION 16134  
OUTLET AND DEVICE BOXES**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Outlet Boxes (wiring device attached to cover).
- B. Device Box (wiring device attached to box).

**1.02 RELATED WORK**

- A. Fire Rated Penetrations: See Section 16030.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 MATERIALS**

- A. Boxes.
  - 1. For use on all interior walls in dry locations, boxes shall be code conforming galvanized steel.
  - 2. For use on interior sides of all exterior walls in dry locations, boxes shall be code conforming galvanized steel.
  - 3. Boxes mounted on ceiling or in conjunction with light fixtures shall be galvanized steel.
  - 4. Do not use sectional boxes for multi-gang outlets.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Where interior boxes are mounted in exterior walls the Electrical Contractor shall provide insulation behind outlet boxes to prevent condensation in boxes.
- B. In all junction boxes exposed to weather, drill 1/8 inch diameter drain hole into box cavity at lowest point. This does not apply to explosion proof boxes.
- C. Wall plates for flush outlet boxes shall be against the wall on all edges and corners. See Test Requirements and Criteria, Section 16010.
- D. Where outlet boxes are installed by doors, windows, or any other wall opening, the outlet box shall be mounted at least four inches away from the frame and any molding around the opening.

**SECTION 16134**  
**OUTLET AND DEVICE BOXES**

- E. Where enclosures are not sized on the Electrical Drawings, it shall be the Electrical Contractor's responsibility to provide a box sized in accordance with associated wiring.
- F. Do not mount recessed boxes back to back in any partition, wall, floor or ceiling.
- G. Do not mount recessed boxes back to back in same stud or framing bay in walls.
- H. Verify that not more than 100 square inches in 100 square feet is being used for penetrations in fire rated walls by outlet and device boxes. Verify that all other UL listing requirements are followed for installation of outlet and device boxes in fire rated walls.

END OF SECTION 16134

**SECTION 16141  
LIGHT SWITCHES**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Wall Switches.

**1.02 RELATED WORK**

- A. Outlet Boxes.
- B. Cover Plates.
- C. Grounding.

- 1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

- NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Provide switches in accordance with the material and symbol lists, notes on the drawing, and this specification.

**2.02 MATERIALS**

- A. Light Switches (ALL TYPES).
  - 1. Shall be rated 20 Amperes.
  - 2. Provide matching two pole, 3 way and 4 way switches.
  - 3. Switches shall be rated 120/277 VAC.
  - 4. Color shall be gray.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Mount top of switch outlet box 48" AFF unless otherwise noted on Drawing.
- A. Coordinate mounting location with Architectural details.
- C. Light switches by doorways shall be mounted on the latch side of the door openings. Verify door

**SECTION 16141  
LIGHT SWITCHES**

swings with Architectural Plans.

- D. Light switches by doorways shall be mounted at least 4" away from door frame.
- E. When more than one light switch (multi-gang) is provided by a door, the lights closest to the door shall be controlled by the light switch closest to the door opening.

END OF SECTION 16141

## **SECTION 16145 RECEPTACLES**

### **PART 1 GENERAL**

#### **1.01 WORK INCLUDED**

- A. Receptacles.

#### **1.02 RELATED WORK**

- A. Outlet Boxes.
- B. Plate Covers.
- C. Grounding.
- D. Identification.
- E. Testing: See Section 16010.

- 1.03 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

### **PART 2 PRODUCTS**

NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

#### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Receptacles shall be by Manufacturers specified on Drawings.

#### **2.02 DEVICES**

- A. Standard Duplex Receptacles: (Not Childproof)

1. Shall be rated 20 Amp, 125 VAC, 2 pole, 3 wire.
2. Shall be polarized, straight blade, with U grounding slot and of NEMA 5-20 configuration.
3. Shall be full gang size.
4. Color shall be gray.
5. Wiring terminals:

- a. Receptacles shall be provided side-wired with screw terminals which when wired must have two full threads of engagement on extruded section in terminal.

- B. Ground Fault Circuit Interrupter Receptacles:

## SECTION 16145 RECEPTACLES

1. Shall be rated 20 Amp, 125 VAC.
  2. Color shall be gray.
  3. Maximum Earth Leakage Current needed to trip shall be .005 Amperes.
  4. Use feed through GFCI ONLY where specifically called for on Electrical Drawings.
  5. Shall have a built-in test circuit.
  6. Where exposed to weather receptacle shall have a waterproof spring loaded cover for exterior mounting. Wet location receptacles shall be waterproof with attachment plug inserted.
  7. GFCI receptacle shall have an indicator light which shows that the receptacle is energized.
- C. Welding and Battery Charger receptacles shall be sized as required. See notes on Drawing.
- D. Plug and receptacle connectors in power cord drops shall be as shown on Drawing.
- E. Provide isolated/insulated ground receptacles where shown on Electrical Drawings. Ground conductor of branch circuit feeding these receptacles shall be insulated and shall not be connected at any point in the electrical system except the grounding electrode conductor. Cover plate mounting screw shall not electrically connect cover to isolated ground system. All isolated ground receptacles shall be orange.
- F. Clothes Dryer Outlet shall be 30 Ampere, 125/250 Volt grounding type unless otherwise noted on Drawing.
- G. Special Receptacles - see Paragraph 3.01G below.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Mount receptacles vertically with bottom of box at 18 inches AFF with grounding pole at top unless otherwise noted on Drawing.
- B. In all areas, coordinate receptacle height with benches and counters. Verify equipment and counter layout and details with other trades. Receptacles shall be mounted eight inches above counters and benches unless otherwise noted on Drawings.
- C. Provide electrically continuous grounding CONDUCTOR for all receptacles. All conduits shall be grounded but shall not be used as grounding conductor.
- D. Receptacles mounted within six feet of every sink or other wet location shall be GFCI type.
- E. Every duplex receptacle shown connected to a switch is intended to mean that the top half of the receptacle is switched and is separated from the bottom half. The bottom half is "on" all the time.

**SECTION 16145**  
**RECEPTACLES**

- F. Before mounting receptacles, the Electrical Contractor shall verify with other trades that the receptacles provided for specific plug connected equipment matches the plug when the equipment is referenced on the Electrical Drawings.

END OF SECTION 16145

## SECTION 16147 COVER PLATES

### PART 1 GENERAL

#### 1.01 WORK INCLUDED

- A. Cover Plates (Standard and Waterproof).

#### 1.02 RELATED WORK

- A. Testing: See Section 16010.

- 1.03 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

### PART 2 PRODUCTS

NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

#### 2.01 MATERIALS

- A. Bakelite, Nylon or PVC: Completely smooth, color to match device for all interior flush mounted receptacles and switches.
- B. Cast Metal: Die cast aluminum furnished with four mounting screws and gasket for exterior receptacles and switches.
- C. Gaskets: Silicon Rubber for use with Exterior and wet interior outlet boxes.
- D. Steel: Hot dip galvanized or cadmium plated.
- E. All exterior receptacle and switch boxes shall be fitted with corrosion resistant, watertight, weatherproof, self closing cover plates.
- F. All weatherproof cover plates shall be sealed against the box and wall with neoprene gaskets.
- G. Wet location receptacles shall be watertight and weatherproof both when the plug cap is in use and when the plug cap is not in use.
- H. Brushed Stainless Steel wall plates shall be used on all flush boxes in finished walls.

#### 2.02 PLATES

- A. Flush mounted plates shall be beveled type with smooth rolled outer edge.
- B. Surface mounted box cover plates shall be beveled, pressure formed with smooth edge to fit box. Break all sharp edges with file.
- C. Waterproof covers shall be gasketed, cast metal for exterior use and PVC or Nylon for interior use with



**SECTION 16147  
COVER PLATES**

spring-loaded gasketed doors to cover receptacles or switch toggle.

- D. Where two-gang boxes are required for single-gang devices, provide special plates with device opening in center of plate. Do not use two gang plates with one opening blanked.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Provide cover plates on all device, outlet, and junction boxes.
- B. Inspect each damp or wet location cover plate installation to insure that the gasket is properly sealing the enclosure.
- C. All cover plates on flush mounted boxes shall be firmly mounted against and touch the wall, ceiling or floor surface on all edges and corners. If a piece of paper can be slid behind the cover plate at any point, that installation is unacceptable and shall be repaired.
- D. All cover plates shall be parallel and perpendicular to major building lines.

**END OF SECTION 16147**

**SECTION 16155**  
**MOTOR STARTERS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Manual and Automatic Motor Starters for all Electric Motor Driven Equipment.

**1.02 RELATED WORK**

- A. All motors installed on this project shall have motor starters provided by the Electrical Contractor unless specifically required to be provided by other trades.
- B. All motor starters which are not an integral part of other equipment will be provided by the Electrical Contractor.
- C. All motor starting characteristics shall be coordinated with characteristics of associated overcurrent protection devices.

**1.03 REGULATORY REQUIREMENTS**

- A. Provide motor protection switches of the appropriate NEMA size.

- 1.04 SUBMITTALS -** Provide shop drawing submittals. Provide characteristic curves for every motor ½ HP and larger showing inrush currents to be used in proper coordination with overcurrent protection devices. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS - NEMA RATED EQUIPMENT ONLY**

- A. Square D.
- B. GE
- C. ITE/Siemens

**2.02 MANUAL MOTOR PROTECTION SWITCHES**

- A. For single phase fractional horsepower motors provide motor load rated switches with thermal overload.
- B. Provide pilot light where so indicated on Electrical Drawings.

**2.03 MAGNETIC AUTOMATIC MOTOR PROTECTION SWITCHES**

- A. Provide contactors with overload relays.

## **SECTION 16155**

### **MOTOR STARTERS**

- B. Provide red pilot light in cover.
- C. Provide Hand-Off-Automatic switch in cover.
- D. Pilot devices, remote control switches, and energy management system drivers shall operate at 120 VAC unless otherwise noted on Mechanical or Electrical Drawings. Provide control transformer with automatic starters of sufficient capacity to power operating coil and associated controls.
- E. Provide indoor surface mounted starters in NEMA Type 1 Enclosure unless otherwise noted.
- F. Where exposed to weather, provide starters in NEMA type 3R enclosures unless otherwise noted.

#### **2.04 COMBINATION MOTOR STARTERS**

- A. Provide fused 3 pole load break disconnect switches with UL Class RK-5 time delay fuses, operating handle, and lock-off facility.
- B. Restrict opening of switch enclosure to the use of an override latch unless switch is in the OFF position.
- C. Provide contactors with overload relays.
- D. Provide pilot light in cover.
- E. Provide Hand-Off-Automatic switch in cover.
- F. Pilot devices, remote control switches, and energy management system drivers shall operate at 120 VAC unless otherwise noted on Mechanical or Electrical Drawings. Provide control transformer with automatic starters of sufficient capacity to power operating coil and associated controls.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. In finished areas, mount motor starter switches flush and with suitable cover plates.
- B. Install overload heaters correlated to full load current of motors provided.
- C. Set overload devices to suit motors provided.
- D. Provide UL Class RK-5 time delay, dual element cartridge fuses sized as shown on Drawing. Verify equipment load with label plate. If equipment label plate requires a minimum circuit ampacity larger than 80% of the fuse size required by the Electrical Drawings, notify the Electrical Engineer immediately.

**END OF SECTION 16155**

## **SECTION 16190 SUPPORTING DEVICES**

### **PART 1 GENERAL**

#### **1.01 WORK INCLUDED**

- A. Conduit Supports.
- B. Cable Supports.
- C. Pull, Outlet, and Junction Box Supports.
- D. Luminaries Supports.

1.02 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

### **PART 2 PRODUCTS**

NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

#### **2.01 CONDUIT SUPPORTS**

- A. Single runs may be supported by beam clamps or ring bolt type hangers with specialty clips. Do not use Plumber's perforated strap.
- B. Horizontal and vertical conduit shall be supported with specifically designed conduit fittings, framing channel, or beam clamps.
- C. Mount conduit as shown in Drawing details when given.

#### **2.02 ANCHOR METHODS**

- A. Hollow Masonry: Toggle Bolts or Spider Expansion Anchors.
- B. Solid Masonry: Lead Expansion Anchors or Preset Inserts.
- C. Metal Surfaces: Machine Screws, Bolts, Clamps made for the specific application or Welded Studs.
- D. Wood Surfaces: Wood Screws and Cable/Conduit Clamps.
- E. Concrete Surfaces: Self Drilling Anchors or Powder- Driven Studs.

NOTE: Welding to building steel shall be done only after review of intended weld location with Structural Engineer.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

**SECTION 16190  
SUPPORTING DEVICES**

- A. Layout to maintain neat mechanical appearance.
- B. Provide supports adequate to carry five times the equipment loads expected.
- C. Follow drawn layouts, when shown, as closely as possible avoiding structural features and equipment of other trades.
- D. Luminaries shall be supported from building structural members.
- E. No conduits shall be supported by pendant wires. All conduit shall be attached directly to the building's structure (except flexible metal conduit), or supported by threaded rod assemblies.

END OF SECTION 16190

**SECTION 16402**  
**UNDERGROUND ELECTRIC FEEDERS & BRANCH CIRCUITS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Underground Electric Service Entrance Lateral.
- B. Underground Electric Feeders and Branch Circuits.
- C. Underground conduits provided for electric power, CATV, Data, Telephone, and Municipal Fire Alarm on both the "Utility Side" and "Owner's Side".

**1.02 RELATED WORK**

- A. Cast-in-Place Concrete or Pre-Cast Transformer Pad.
- B. Conduit.
- C. Wires and Cables.
- D. Work includes Primary Conduit, Cable, and Riser at Pole.
- E. Testing: See Section 16010.
- F. Fire Rated Penetrations: See Section 16030.

**1.03 REGULATORY REQUIREMENTS**

- A. Street opening permits are required.

**1.04 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 MATERIALS**

- A. Conduit: See Section 16111.
- B. Concrete: 3,000 PSI.
- C. Markers: Every buried conduit shall be marked by warning tape installed 12 inches below grade.
- D. Drainage Assembly: Provide 1/2 inch drain hole at lowest point in each conduit.

**PART 3 EXECUTION**

**SECTION 16402**  
**UNDERGROUND ELECTRIC FEEDERS & BRANCH CIRCUITS**

**3.01 UNDERGROUND INSTALLATION**

- A. Provide adaptation from PVC conduit to steel bends. All bends in service entrance lateral shall be steel.
- B. Slope service to drainage point. (Source end)
- C. Terminate service conduit in main panel with grounding bushing. Make ground connection from bushing to distribution center ground bus.
- D. Terminate service conduit at transformer with grounding bushing. Make ground connection from bushing to transformer housing and ground bus.
- E. Clean and swab ducts before pulling conductors.
- F. Pull all conductors in a conduit at the same time.
- G. Provide weatherhead, conduit, connectors, and conductors as required by the local Utility.
- H. Include in bid all work in support of and payments required by local utilities in connection with underground service.
- I. Place feeder conduit on undisturbed soil where possible. Use pit run gravel and sand, placed in six inch lifts and compact backfill.
- J. Street opening permit and street repair shall be included in the bid as part of this project.

**END OF SECTION 16402**

**SECTION 16430**  
**METERING**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Provide Metal Housing, Meter Socket, and Service Enclosure for Meter.
- B. Provide all equipment, connectors, and conductors not furnished and installed by the local electric power utility.

**1.02 RELATED WORK**

- A. Panelboard.
- B. Electric Service.
- C. Service Entrance.
- D. Grounding.
- E. Conduit.
- F. Meter Transformers, Transformer Enclosures and Sockets.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Provide metering enclosures and associated conduits and wiring.
- B. All metering equipment and enclosures not furnished and installed by local electric power utility shall be provided by the Electrical Contractor.

**END OF SECTION 16430**



## **SECTION 16450 GROUNDING**

### **PART 1 GENERAL**

#### **1.01 WORK INCLUDED**

- A. Power System Grounding.
- B. Telephone System Grounding.
- C. Municipal Fire Alarm System Grounding.

#### **1.02 RELATED WORK**

- A. Section 16111 - Conduit.
- B. Section 16120 - Wire and Cable.
- C. Testing: See Section 16010.
- D. Fire Rated Penetrations: See Section 16030.

- 1.03 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

### **PART 2 PRODUCTS**

NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

#### **2.01 GROUNDING RODS**

- A. Provide copper, clad steel grounding rods.

#### **2.02 GROUNDING ELECTRODE CONDUCTOR**

- A. Provide at least two grounding electrodes at least six feet apart, exterior to the building at more than 5' from the building foundation.. Provide as many more than two as needed to achieve a 10 Ohm ground resistance. Test ground rod resistance prior to covering with soil and prior to connection to the building power distribution system grounding electrode conductor.
- B. Bond and ground domestic water systems.

### **PART 3 EXECUTION**

#### **3.01 POWER SYSTEM GROUNDING**

- A. Circuit Grounding: Provide grounding bushings, studs, jumpers, and bonding conductors as required at service entrance, panelboards, and distribution system Users' equipment.

**SECTION 16450**  
**GROUNDING**

- B. Provide as many ground rods as necessary to achieve a safe and adequate system ground. See paragraph 2.02 C. above.
- C. Ground rods shall be tested prior to connection to the building power distribution system grounding electrode conductor.

**3.02 COMMUNICATION SYSTEM GROUND**

- A. Telephone: Provide one AWG #2 with green THWN insulation from ground bus at telephone service entrance to the electrical system grounding electrode.

**3.03 GROUNDING CONDUCTOR**

- A. All metallic conduit shall be grounded but shall not be used as the grounding conductor.
- B. A separate green insulated grounding conductor shall be provided for every feeder, sub-feeder and branch circuit in conduit.
- C. Multi-wire branch circuits will not be allowed on this project.

**3.03 TIE POINTS**

- A. Measure exact location of ground rods and tie to easily recognized building structural feature. Add these measurements and the location of the ground rods to the as-build drawings.

**END OF SECTION 16450**

**SECTION 16455  
EARTH GROUNDING**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. Related Work Specified
  - 1. Electrical General Provisions (Section )
  - 2. Basic Materials and Methods (Section)
- B. Work Specified Herein:
  - 1. Electrolytic Earth Grounding Installation.
  - 2. Testing Procedures.

**1.02 GENERAL**

- A. Grounding systems: Electrolytic Maintenance Free
  - 1. Components: XIT Grounding electrode with 4/o AWG (or as specified) exothermically welded pigtail, protective cover box and sufficient quantity of Lynconite II backfill for a standard installation

**PART 2 PRODUCTS**

**2.01 PRODUCTS**

- A. General
  - 1. Self contained ground system using electrolytic action to enhance the ground performance shall be provided where specifically indicated on the drawings.
  - 2. Ground rod system shall be 100% self-activating/sealed and maintenance free for 30 years. No additions of chemical or water solutions required.
  - 3. The ground rod shall operate by hygroscopically extracting moisture from the air to activate the electrolytic process improving performance.
  - 4. Ground rod system shall be U.L.L. listed and manufactured for then years or more.
  - 5. Ground system manufacturer shall be ISO 9000 certified.
- B. Electrode Unit
  - 1. All cooper ground rod shall consist of a 2" nominal diameter hollow copper tube with a nominal wall thickness of .083P. The tube shall be permanently capped on the top of vertical

## **SECTION 16455 EARTH GROUNDING**

portion of the tube and drainage holes shall be provided along the bottom length of the tube for electrolyte drainage into the surrounding backfill material (Lunconite II).

2. The XIT rod shall be filled from the factory with non-hazardous Calsolyte™ salts to enhance grounding performance.
3. Ground rod shall be a minimum of ten feet long with a vertical riser 3' length.
4. A stranded 4/0 AWG copper ground wire shall be exothermically welded to the side of the vertical portion of the rod for the electrode to grounding conductor connection.

### **C. Protective Cover Box**

1. Precast concrete box with slots for conduit entrances. Minimum size ten inch diameter by twelve inches high. Cast iron grate flush cover with "breather" slots, XIT model XB-12C.

### **D. Backfill Material**

1. Natural volcanic, non-corrosive form of Lunconite II clay grout backfill material free of polymer sealants. Quantity of 50 lb. Bags varies with the length of the electrode and width of the trench.
2. Shall absorb approximately 13 gallons of water per 50 lb. Bag for optimal 30% solids density.
3. PH value 8-10 with maximum resistivity of <1 ohm-m at 30% solids density.

## **2.02 ELECTROLYTIC GROUNDING SYSTEM: INFORMATION AND SPECIFICATIONS.**

- A. Manufacture: Lyncole XIT™ Grounding
- B. Shaft configuration: L-shaped. Standard lengths: 3 ft. by 10 ft.
- C. UL Listing: 467
- D. Warranted for 30 years with a minimum life expectancy of 50 years.
- E. ISO 9000 Certified.
- F. Material: Type K copper 0.083": nominal wall thickness.
- G. Construction: Hollow tube, 2.125' O.D., filled with non-hazardous Calsolyte™ salts.
- H. Weight: 3.5 lbs. Per lineal foot.
- I. Ground Wire Termination: Exothermic connection to #2 conductor. U-bolt with pressure plate provided as test / temporary connection point.
- J. L-shaped Model No: K2I-10CSz

## SECTION 16455 EARTH GROUNDING

### PART 3 INSTALLATION

#### 3.01 INSTALLATION

##### A. General

1. To achieve specific earth resistance, contact Lyncole for engineering design assistance. Preliminary step in grounding design requires a "Wenner four-point" soil resistivity test be performed at the job site by Lyncole or others.
2. Install ground rod system in compliance with manufacturer's instructions or recommendations.

##### B. Excavation

1. Excavate a 6-12 inch wide trench, trench must be 8 inches deeper than the vertical length of the rod (minimum 3 feet); slope rod in trench to insure bottom cap of unit is below the elbow.
2. Remove sealing tape from leaching holes on the horizontal section only.

##### C. Backfill

1. Place XIT unit in trench, so that the top of unit is about 6" below grade. Support the XIT unit so that it is approximately 2" above the bottom of the trench.
2. Lynconite II is a highly conductive backfill included with the system. Mix each 50 lb. Backfill grout material with 13 gallons of water to form a slurry and pour around XIT rod. Pouring the Lynconite II into the water facilitates the mixing process. A sonotube may be used temporarily to assist during backfill installation on the vertical portion of the rod.
3. Backfill to the "Bury to here" label.
4. Place protective box so top is flush with grade level. Finish backfilling trench with soil. Use backfill or grout to stabilize box around rod.
5. Remove sealing tape from top breather holes to activate.

##### D. Connection

1. Connect the grounding conductor to XIT rod pigtail exothermically (thermo-Weld).
2. Bury grounding conductor 6" below the frost line. Cover bare conductor with a small amount of Lynconite II backfill for protection against corrosion.

#### 3.02 TESTING

- ##### A.
- Certified measurements to be taken and submitted prior to connection to main service utility ground.

**SECTION 16455  
EARTH GROUNDING**

Ground system resistance shall not exceed 5 ohms.

- B. Upon completion of the ground installation and before connection to permanent facility power, the electrical contractor shall provide at his expense, a performance measurement of the new earth grounding electrode system. The testing shall utilize either an earth resistance meter and be conducted in accordance with the IEEE Standard 3-point fall of potential method or with a Clamp-on Resistance Test meter.
  - 1. If the 3-Point fall of potential test is utilized, the ground system must be isolated from any utility neutral connections and/or outside ground references prior to testing.
  - 2. If the Clamp-On resistance test is utilized, a single path must exist between the ground system and a utility reference.
- C. Notify the Owner's representatives three days prior to the scheduled testing date so they may be present at the time of testing.
- D. The grounding system shall pass either a 3-Point Fall of Potential test or the Clamp-on Resistance test. The minimum of 5 times the length of the electrode for a single rod, or 5 times the diagonal of a ground grid (10 times is desired). Contractor shall provide a plot of the curve of resistance vs. distance to the Owner. The contractor shall immediately notify the Owner's representative if the measured resistance is above 5 ohms.
- E. The Clamp-on resistance testing shall be completed utilizing a single ground reference path between the ground system and the reference utility. This will be accomplished either through the ground conductor of a single point ground or by means of a temporary bonding jumper between the installed ground system and a utility reference, prior to any bonding to the system. Should the measurement of the resistance be less than 1 ohm to earth, contact the Owner's representative to verify that the ground system has been designed to achieve 1 ohm. If not, the reading is likely a measurement of continuity and not ground resistance.
- F. The manufacturer or an independent testing firm shall be employed for the testing and report. The contractor shall submit a copy of the test report to the Owner's representative within 10 days after testing and before the ground system becomes inaccessible.

END OF SECTION 16455

**SECTION 16474**  
**PANELBOARDS AND SWITCHBOARDS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Provide circuit breaker panelboards as indicated in the panelboard schedules and on the drawings. Panelboards shall be equipped with bolt-on thermal-magnetic molded case circuit breakers with frame and trip ratings as shown on the panel schedule.

**1.02 RELATED WORK**

- A. Fire Rated Penetrations: See Section 16030.

- 1.03 SUBMITTALS - Provide shop drawing submittals including Time Current Curves for all circuit breakers. Provide circuit breaker characteristic trip curves for every circuit breaker. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

- NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- NOTE: See Material Schedule and Panel Directories on Drawings.

**2.02 CIRCUIT BREAKERS**

- A. Interrupting ratings shall be at least 22,000 rms symmetrical amperes unless otherwise noted on the Electrical Drawings. Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads shall carry the SWD marking.

**2.03 BUSSING ASSEMBLY AND TEMPERATURE RISE**

- A. All current carrying parts of the bus structure shall be copper.

**2.04 CABINETS AND FRONTS**

- A. Each front shall include a door and have a flush cylinder tumbler-type lock with catch and spring-loaded door pull. All panelboards locks shall be keyed alike. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Panel trim shall be surface or flush as indicated on the Electrical Drawing.

**2.05 EQUIPMENT SHORT CIRCUIT RATING**

- A. Each panelboard and installed circuit breakers shall have short circuit current ratings equal to or greater than the AIC rating shown on the Panelboard Schedule on the Electrical Plans, or given in this Specification. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage. Unless otherwise noted on panel directories or riser diagrams, the minimum AIC

**SECTION 16474**  
**PANELBOARDS AND SWITCHBOARDS**

rating shall be 22,000 Amps. AIC ratings are not to be based upon series ratings.

**2.06 COORDINATION**

- A. All circuit breakers are to be coordinated throughout the power distribution system. Provide a set of Time Current Curves for every circuit breaker in the project to be used by the Electrical Engineer to review the coordination of the proposed circuit breakers.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Provide filler pieces for unused spaces.
- B. Prepare and affix typewritten directory to inside cover of panelboard indicating loads controlled by each circuit.
- C. The word "spare" on panel directories means to provide a spare circuit breaker of the size shown.
- D. The word "space" on panel directories means to provide a blank location where a future circuit breaker could be located.
- E. Label branch circuit wiring inside panelboard with descriptive tags.

**END OF SECTION 16474**



**SECTION 16477**  
**SAFETY SWITCHES & DISCONNECTING MEANS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Provide Motor Disconnects.
- B. Provide Circuit and Equipment Disconnects consisting of fused switches and enclosed circuit breakers as shown on the Electrical Drawings.
- C. Pad Locks for Enclosures.

**1.02 RELATED WORK (includes but is not limited to:)**

- A. Pumps.
- B. Compressors.
- C. Motors.
- D. Fixed Electrical Equipment.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 FUSED SAFETY SWITCHES**

- A. Fuses: All fusible switches shall accept Class R fuses and have installation of a UL listed rejection feature to reject all, except Class R fuses.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Where fusible Disconnect Switches are specified, they shall be fused in accordance with the load installed unless the Drawing specifically states that the switch is non-fusible.
- B. In cases where the fuse size is left blank on the Electrical Drawings, the Electrical Contractor shall provide fuses sized in accordance with the label plate on the equipment served.
- C. Provide UL Class RK-5 time delay, dual element cartridge fuses sized as shown on Drawing. Verify equipment load with label plate. If equipment label plate requires a minimum circuit ampacity larger than 80% of the fuse size required by the Electrical Drawings, notify the Electrical Engineer immediately.

**SECTION 16477**  
**SAFETY SWITCHES & DISCONNECTING MEANS**

- D. Where enclosed circuit breakers are specified, they shall have the frame and trip size indicated on the Electrical Drawings. The AIC rating of the circuit breaker shall be based upon the available fault current unless otherwise indicated on the Electrical Drawings.
- E. The contractor shall provide pad locks for all electrical disconnect switches installed exterior to the building that are accessible at grade level. All pad locks shall be weather proof and shall be operated by the same key.

END OF SECTION 16477

## **SECTION 16501 LAMPS**

### **PART 1 GENERAL**

#### **1.01 WORK INCLUDED**

- A. Provide lamps listed in Luminaire Schedule on Drawing or specified herein.

#### **1.02 RELATED WORK**

- A. Interior Building Lighting.
- B. Ballasts and Accessories.
- C. Site Lighting.

#### **1.03 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.**

- A. Substitute luminaire proposals shall include point by point footcandle plots submitted for the area to be lighted.

### **PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

#### **2.01 ACCEPTABLE MANUFACTURERS**

- A. If lamp manufacturer is not specified on the project drawings, firms regularly engaged in manufacture of Lamps of types and ratings required, whose products have been in satisfactory use in similar service for not less than one year may be provided.

#### **2.02 FLUORESCENT LAMPS**

- A. Fluorescent lamps shall be the wattage, size, lumen output and life given in the Luminaire Schedule or attributed to the particular Manufacturer listed. The color of all fluorescent lamps shall be 3500 degrees Kelvin unless noted otherwise on the Drawings.

#### **2.03 HIGH INTENSITY DISCHARGE LAMPS**

- A. High Intensity Discharge lamps shall be wattage, lumen output, rated life, bulb and base type, phosphor coating, and contain safety features given in the Luminaire Schedule or attributed to the particular Manufacturer listed.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Provide lamps in accordance with the combined instructions of both the lamp Manufacturer and the

**SECTION 16501**  
**LAMPS**

Luminarie Manufacturer.

END OF SECTION 16501

**SECTION 16502  
BALLASTS AND ACCESSORIES**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Provide required Ballasts.
- B. Split wired where indicated.

**1.02 RELATED WORK**

- A. Interior Building Lighting.
- B. Lamps.
- C. Site Lighting.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Firms regularly engaged in Manufacture of Ballasts of types and ratings required and whose products have been in satisfactory use in similar service for not less than one year.
- B. Provide Ballasts that meet the standards of UL, Certified Ballast Manufacturer's Association, and requirements stated on the Luminaries Schedule and as specified herein.
- C. Ballasts shall be specifically listed for use with the lamp type given in the Luminaries Schedule.
- D. No multi-tap Ballasts are to be provided.

**2.02 FLUORESCENT BALLASTS**

- A. Ballasts shall operate at the line voltage of the installation, shall be thermally protected, have 95% or higher Power Factor, be Group A noise rated and, if given on the Luminaries Schedule, be by the Manufacturer listed.
- B. Utilize Two-Lamp Ballasts wherever possible.
- C. Equip Ballasts with non-PCB capacitors and pressure relief devices to prevent rupturing.
- D. All interior fluorescent lamp Ballasts shall have a Class "A" sound rating.

**SECTION 16502**  
**BALLASTS AND ACCESSORIES**

- E. Exterior Ballasts shall have low temperature rating for reliable starting -20 degrees Fahrenheit.

**2.03 HIGH INTENSITY DISCHARGE BALLASTS**

- A. Ballasts shall be rated for the voltage shown on the Drawings in the Luminaries Schedule or in the Specification.
- B. Non-PCB capacitor shall be installed by Manufacturer with Ballasts to correct the Power Factor of the incoming supply line to 95 percent or greater.
- C. Exterior Ballasts shall be rated for satisfactory starting at -20 degrees Fahrenheit.
- D. All interior ballast assemblies shall be remote mounted to achieve a Class "A" sound rating.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Provide Ballasts specifically designed and listed for lamps specified in the Luminaries Schedule.
- B. Interconnecting wiring in Fluorescent Ballast Compartments shall be rated for operating at a temperature of not less than 90 degrees Centigrade.
- C. Wires shall be connected with spring loaded wire nuts temperature rated for the wires being connected.
- D. Interconnecting wiring in HID Ballast compartments shall be rated for operating at a temperature of not less than 105 degrees Centigrade.

**END OF SECTION 16502**

**SECTION 16503  
POLES AND STANDARDS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Provide Poles and Standards.
- B. Base reinforcement and Anchor Bolts.
- C. Colored Concrete.

**1.02 RELATED WORK**

- A. Cast-In-Place or Pre-Cast Concrete.
- B. Wires and Cables.
- C. Grounding.
- D. Site Lighting.

1.03 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Poles shall be supplied by the same Distributor as the Luminaries mounted thereon.

**2.02 POLES**

- A. Poles shall be provided with strength to withstand 120 mph wind gust.
- B. Configuration: Cross sectional shape shall be as specified on the Drawings.
- C. Handhold: Shall have removable weatherproof cover installed above bottom of pole.

**.03 ANCHOR BOLTS**

- A. Provide anchor bolts with sufficient strength to withstand 120 mph wind gust.
- B. Provide template for positioning of Anchor Bolts.

**PART 3 EXECUTION**

**SECTION 16503**  
**POLES AND STANDARDS**

**3.01 BASES**

- A. Construct of concrete with minimum dimensions as shown on Electrical Drawings.
- B. Provide Anchor Bolts in accordance with this manufacturer's requirements to meet the project specification.

**3.02 INSTALLATION**

- A. Mount standards on bases plumb and true, utilizing shims as necessary.
- B. Assemble pole and Luminaries mounting bracket as described by the Manufacturer.
- C. Touch-up scratches on poles upon completion.

**END OF SECTION 16503**



**SECTION 16510  
INTERIOR BUILDING LIGHTING**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. This Section includes Supply and Installation of Luminaries, Supports and Accessories.

**1.02 RELATED WORK**

- A. Wires and Cables.
- B. Supporting Devices.
- C. Lamps.
- D. Ballasts and Accessories.
- E. Testing: See Section 16010.
- F. Fire Rated Penetrations: See Section 16030.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

- A. Substitute luminaire proposals shall include point by point footcandle plots submitted for the area to be lighted.

**1.04 COORDINATION**

- A. Provide compatibility for interface of other materials with Luminaries and Support system.
- B. Coordinate with field conditions to avoid conflicts between Luminaries, Supports, Fittings, and Mechanical Equipment.

**1.05 REQUIREMENTS**

- A. The completely assembled and installed luminaries shall have a group or class "A" sound rating.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. See Drawing Luminaries Schedule for Equipment Manufacturer and part number.

**PART 3 EXECUTION**

**SECTION 16510**  
**INTERIOR BUILDING LIGHTING**

**3.01 SUPPORTS**

- A. Refer to SUPPORT SECTION of Specification and Drawing details.
- B. Supports for pendant Luminaries shall each be tested by the Electrical Contractor to demonstrate that they will hold a weight of 60 pounds before installing the Luminaries.

**3.02 INSTALLATION**

- A. Provide Luminaries with lamps as shown on the Drawings and described in the Specifications.
- B. Provide supporting means described above and referred to in Section 16190.

**3.03 ALIGNMENT**

- A. Align Luminaries and clean diffusers and reflectors prior to final acceptance.

**END OF SECTION 16510**

**SECTION 16520**  
**EXTERIOR BUILDING LIGHTING**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Exterior Luminaries.

**1.02 RELATED WORK**

- A. Outlet Boxes, Weatherproof.
- B. Lamps/Ballasts.
- C. Testing: See Section 16010.
- D. Fire Rated Penetrations: See Section 16030.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

- A. Substitute luminaire proposals shall include point by point footcandle plots submitted for the area to be lighted.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Refer to Luminaries Schedule on Drawings.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install Weatherproof Outlet Boxes where shown on the Drawings.
- B. Install Lighting Equipment on Building where shown on Drawings.
- C. Aim Luminaries and lock in place to prevent movement.
- D. Provide Lamps and clean Luminaries interior prior to final inspection.

**END OF SECTION 16520**

**SECTION 16530  
SITE LIGHTING**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Exterior Luminaries.
- B. Lighting Control System.

**1.02 RELATED WORK**

- A. Conduit.
- B. Lamps.
- C. Ballasts and Accessories.
- D. Wire, Conductors, and Connections.
- E. Enclosures.
- F. Grounding.
- G. Testing: See Section 16010.
- H. As-built underground conduit locations.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

- A. *Substitute luminaire proposals shall include point by point footcandle plots submitted for the area to be lighted.*

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Refer to Luminaries Schedule on Drawings.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Provide underground wiring in conduit where shown on the Drawings.
- B. Provide lighting equipment on building and poles where shown on Drawings.

**SECTION 16530**  
**SITE LIGHTING**

- C. Provide cable in IMC with threaded connectors above ground.
- D. Conduit connections at Luminaries shall be watertight.
- E. The Contractor shall aim Luminaries and lock in place to prevent movement.
- F. Provide lamps and clean Luminaries interior prior to final inspection.
- G. Show as-built location of under ground site lighting conduits on Electrical Site Drawing and Civil Engineering Site drawing.

END OF SECTION 16530

**SECTION 16580**  
**EMERGENCY LIGHTING**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Emergency Lighting and Exit Signs.
- B. Provide AC power to all Self Contained Emergency Powered Exit Signs.

**1.02 RELATED WORK**

- A. Testing: See Section 16010.
- B. Fire Rated Penetrations: See Section 16030.

**1.03 SUBMITTALS -** Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

- A. Substitute luminaire proposals shall include point by point footcandle plots submitted for the area to be lighted.

**PART 2 PRODUCTS**

**NOTE:** All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

**2.01 ACCEPTABLE MANUFACTURERS**

- A. Refer to Luminaries schedule on drawing for AC and DC Emergency Lighting System Equipment.

**2.02 EMERGENCY BATTERY UNITS**

- A. Provide fully automatic operation on power failure with minimum operating time of 90 minutes for light heads and exits.
- B. Provide battery, fully automatic chargers with built-in test switch, battery state indicator, and mounting brackets.
- C. Battery output power shall be fused by manufacturer.

**2.03 EMERGENCY LIGHT SYSTEM**

- A. Battery packs shall have a minimum three year full warranty with a minimum eight year life expectancy.
- B. Lamps and lampholders shall be described on the Electrical Drawings.
- C. Aim lamps to provide one foot-candle on the floor over the NFPA-101 required means of egress.

**SECTION 16580**  
**EMERGENCY LIGHTING**

**2.04 EXIT SIGNS**

- A. Directional arrows shall be provided to point out the location of exits when not directly below exit sign.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Aim light heads at floor or stair to provide illumination as specified in the latest edition of the Life Safety Code (NFPA-101).
- B. In no case shall the voltage drop between battery unit and furthest remote light be greater than 5% of the battery voltage.
- C. Provide unit in accordance with the Manufacturer's Instructions and notes on the Drawings.
- D. Provide wiring to remote light heads (and exit signs) for emergency power in same circuit configuration and wire size as shown on emergency lighting riser diagrams. Circuits in riser diagrams were designed for maximum 5% voltage drop.
- E. Provide junction box near battery pack for connection of multiple circuits to emergency power branch circuit conductors from battery.

**END OF SECTION 16580**

## PART 1 GENERAL

### 1.01 WORK INCLUDED

- A. Fire Alarm Systems.
- B. Central Station connection as required by local Fire Department.
- C. Temporary Fire Alarm System.

### 1.02 RELATED WORK

- A. Systems Demonstration.
- B. Identification System.
- C. Controls and Instrumentation.
- D. Conduit - *painted red*.
- E. Wires and Cables.
- F. Testing: See Section 16010.
- G. Fire Rated Penetrations: See Section 16030.

### 1.03 REFERENCES

- A. The Contractor shall coordinate the Fire Alarm installation and verify that the installation is in accordance with the requirements of the local Fire Department and NFPA 72 Series Documents.
- B. The Contractor shall provide alarm horns and strobes in accordance with the visible notification requirements of the Americans with Disabilities Act.

### 1.04 SYSTEM DESCRIPTION

- A. Supervised non-coded 24 volt DC, "Class A" system.
- B. Provide manual fire alarm pull stations, thermal detectors, horns, and sprinkler circuits fully supervised.
- C. System shall operate with manual stations, smoke and heat detectors, and sprinkler circuits as follows:
  - 1. Actuate control panel to cause evacuation alarm continuously throughout building.
  - 2. Indicate alarm origin on main entrance to building.
  - 3. Transmit signal to central station service.

### 1.05 REGULATORY REQUIREMENTS

- A. Installation subject to approval, inspection, and test of applicable regulatory agency, and the authority



having jurisdiction.

- B. System design shall be submitted by Contractor to the local Fire Department for final approval prior to system purchase and construction.

1.06 SUBMITTALS - Provide shop drawing submittals. See Section 16000, Paragraph 1.15 and Section 16020, Parts 2 and 3.

## PART 2 PRODUCTS

NOTE: All products shall meet NEMA construction and testing standards and UL listing requirements applicable to the intended use for this project.

### 2.01 MANUAL FIRE ALARM STATION

- A. Manual: Non-coded, semi flush mounted, indicating operation physically until reset, double action, key reset, and non break glass.

### 2.02 PRODUCTS OF COMBUSTION DETECTORS

- A. Provide, where shown, smoke detectors having the following features:
  1. Blinking LED for visual supervision of satisfactory operating status (non-alarm).
  2. Blinking LED to lock "ON" at full brilliance in alarm.
  3. Detector shall be reset from control panel.
  4. Complete detector functional test shall be possible without generating smoke.
  5. SPDT auxiliary contacts shall be provided where necessary.

### 2.03 ALARM DEVICES

- A. All alarm devices shall be combined audio-flashing visual strobe units except where otherwise shown on the electrical drawings.
- B. After installation, the whopping sound level output of the horn shall be not less than 87 dBA at 10 feet, omni-directional.
- C. After installation, the visible signaling device shall flash approximately but not less than once in every two seconds and the effective intensity shall as shown on the electrical drawings. All strobes throughout the project shall be synchronized to flash at the same time.
- D. Minimum rated life for combined audio-visual unit shall be 200 hours of continuous operation.
- E. Horn/strobe alarm units connected to auxiliary contacts on single station smoke detectors shall have the same dB and candlepower and shall operate on 120 VAC. (Not required to have slow whoop.)

### 2.04 REMOTE ANNUNCIATOR

- A. Provide remote annunciator at main entrance or other location at direction of the local Fire

Department.

- B. Remote annunciator shall have illuminated individual visual indication of zone in alarm, system trouble, zone in trouble and audible indication of system and zone trouble
- C. Remote annunciator shall have trouble silence switch.
- D. Provide engraved laminated name plates beside alarm and trouble lights with word description of zone, not zone number.

## 2.05 CONTROL PANEL

- A. Steel construction, hinged front cover, key locked.
- B. Provide control panel for connection to master box and local Fire Department.
- C. Equip panel with:
  - 1. Door mounted annunciator panel.
  - 2. Separate trouble light for each zone.
  - 3. Trouble buzzer light and trouble silence switch.
  - 4. Separate trouble light to supervise standby power.
  - 5. System reset switch.
  - 6. Provide zone disconnect switches.
  - 7. See system riser diagram on Electrical Drawings for minimum functional requirements.
- D. Provide supervision of system as follows: A break or a ground on a circuit to a fire alarm station, detector, alarm, annunciator circuit operation of evacuation alarm silence switch causes trouble signal, with trouble lamp illuminated. Trouble signal silence switch silences buzzer but lamp remains illuminated. On restoration of the system, the trouble signal to remain energized until trouble signal silence switch is restored to normal. On loss of normal AC power, the trouble alarm operates and illuminates emergency power supervisory pilot lamp. Operation of the trouble alarm silence switch silences trouble signal but power supervisory lamp remains illuminated. On restoration of normal power, trouble alarm remains energized until the silence switch is restored to normal.
- E. Incorporate relays in control panel to control and activate systems referenced under Related Work.

## 2.06 POWER SUPPLY (NORMAL AND STANDBY)

- A. Take normal power supply from independent 120 volt, 20 ampere circuit.
- B. Provide rectifier as part of control panel or as separate unit to automatically maintain standby battery bank fully charged under normal conditions and sized to recharge standby batteries in 12 hours maximum, following emergency operation. Rectifier to operate the system when batteries are disconnected.

- C. Provide standby battery bank floating across the line. Provide batteries of sufficient capacity to operate system under standby load conditions without recharging for 60 consecutive hours and then have sufficient power left to operate complete system in alarm for 5 minutes. Mount batteries in a steel locked enclosure located where ambient temperatures will be 40 degrees F (4 degrees Centigrade) minimum.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Provide fire alarm wiring in electrical metallic conduit painted red. Wire system class "A".
- B. Wire Size: All conductors shall be sized so that system components operate as specified.
- C. Fire alarm conductor terminations in control panel and annunciator panels to be made on terminal strips with separate point for each conductor. All such strips to be number identified as shown on wiring diagram attached to inside of door of control panel. Connect wiring neatly to terminal strips. Set up termination of cabling so that sections of the system may be isolated or shorted out for servicing.
- D. Flush mount magnetic door holders at top of each door and connect to fire alarm control panel so that doors close when alarm sounds.
- E. From fire alarm control panel, make connection to motor control centers and related equipment as required for smoke evacuation, smoke control, elevator control and other required life safety systems.
- F. From fire alarm control panel provide one 3/4 inch conduit to nearest telephone backboard or panel location for tie-in to central station.
- G. Provide control connection to elevator controller.
- H. Mount fire alarm boxes with top of box at 48 inches above finished floor.
- I. Provide power supply circuit breaker with lock "ON" device in a location that is accessible only to authorized personnel.
- J. The horn-light units shall be mounted in such a manner as to meet the requirements of NFPA-72, the Americans with Disabilities Act, and State and Local building codes and ordinances. See test requirements under paragraph 3.02 below.

3.02 FIELD QUALITY CONTROL: See Section 16010.

#### 3.03 FIRE ALARM SYSTEM CERTIFICATION

- A. After satisfactory completion of an operational acceptance test (see Section 16010), a Certificate of Compliance (NFPA-72A Figure 2-2.4) shall be completed and delivered to the Electrical Engineer for review and acceptance. After acceptance by the Electrical Engineer, copies of the Certificate of Compliance shall be provided to the Owner, the local Fire Department and authorities having jurisdiction.

END OF SECTION 16721

END OF ELECTRICAL SPECIFICATION